GAS JOURNAL, JAN. 12, 1938

VOL. 221. 90th YEAR. No. 3895.

Editorial Notes

Engineering and the Public

AT the instigation of the Institution of Civil Engineers an Engineering Public Relations Committee has been set up, and on it fourteen engineering bodies, including The Institution of Gas Engineers, are represented. The aims and objects of the Committee were made known last week. Briefly, the idea is "to present to the public in suitable form information concerning the science and practice of engineering and its services to the public." Commencing in a modest way the Committee hopes in time greatly to extend its influence and the scope of its work. It is hoped to provide an organization to which the general and technical Press can refer for information concerning any items of engineering interest which come to their notice and have news-value. At the same time, steps will be taken to bring to the notice of the Press engineering works which are likely to be of interest to the public. It is proposed, too, to co-operate with the B.B.C. and with news-reel film companies.

It is true, of course, that many interesting works of considerable news-value are carried out about which the public hears little or nothing—and this in spite of the fact that more than one-seventh of the available working population of our country earns its livelihood by engineering. It is also a fact that almost every day reports on engineering and technical happenings and developments appear in the popular Press which are, to say the least, inaccurate. If the Engineering Public Relations Committee, a sort of engineering clearing house to which the Press can refer, can remedy this it will certainly have accomplished much. Everything is to be said for fostering the closest relationship between the lay Press and the engineering organizations, and it is to be hoped that this representative Committee, speaking for the whole engineering profession, will prove useful in this regard. Exactly how the Public Relations Officer, already appointed, will deal with this aspect of the Committee's work we do not know. Suppose, for example, a pressman is in doubt about a matter affecting the Gas Industry. We take it that he will be expected to communicate with the Public Relations Officer, who will doubtless refer him to one of the national bodies of the Industry. On the other hand, the pressman could save himself trouble by communicating directly with Gas Industry House. Again, would The Institution of Gas Engineers pass an item of news to the Press via the Public Relations Committee?

However, it is undoubtedly desirable that the public should have presented in suitable form "information concerning the science and practice of engineering and its services to the public." In one direction—the holding of lectures on engineering for young people—a start was made in London on Friday and Monday last, when, under the auspices of the Committee, lectures were given on the methods of construction of world-famous bridges. Panels of lecturers are being organized in various parts of the country, and a library of films of engineering interest is being formed for the use of lecturers. It is also proposed to organize exhibits illustrating various branches of engineering which will be shown first in London and then circulated to provincial centres. The point is that the work of the engineer is taken for granted by the public, which fails to appreciate the responsibility the engineer has to bear and the place he should occupy in the life of the community. This lack of recognition it is the aim of the Engineering Public Relations Committee to remedy; and in its activities we hope that the claims of the gas engineering profession will be adequately satisfied.

Comparative Figures

THE busiest time of the year, so far as company meetings are concerned, is now almost upon us, and shareholders will be looking forward with some eagerness to reports and accounts and chairmen's addresses. Nowadays a company meeting is, as a rule—there are exceptions, of course—a calm and well-ordered function, which the normal shareholder is in a position to follow closely from beginning to end. In the matter of clarity of explanation and elucidation of detail—again, there are exceptions, of course—his every need is met, and frequently anticipated. On his own side, he requires no more than average intelligence to enable him to take a real interest in the business in which he has invested his money, and to determine with some measure of exactitude whether or not the position of the undertaking is satisfactory. This is as it should be, for to-day it is the rule, rather than the exception, for a person to be a shareholder in "something."

Looking at the matter broadly then, the modern shareholder's every need is met. One thing which assists him greatly is the rapidly growing practice of adding to the accounts for the year parallel columns showing the corresponding figures for the previous twelve months, thus enabling a comparison to be made at a glance. Many of the larger gas companies already do this, and doubtless the practice will spread as its advantages become increasingly recognized. We

assert this with some confidence, in spite of the fact that only a few days ago the chairman of an important company—not a gas company—in reply to a shareholder, said: "I have been advised that it is not legal to put any figures in the balance sheet except the figures that refer to the year under review. I know other companies do it, but I think it is my duty to say what I believe is correct." Subsequently the *Financial Times* learned from the chairman that this opinion was based upon advice given by a barrister.

It is therefore comforting to learn, from the same contemporary, that London accountants with whom the matter has been discussed are unanimously of the opinion that the practice does not contravene the law. None had heard of any decision by the Courts which could support the contention of illegality. This is both gratifying and reasonable. The insertion of comparative figures serves a distinctly useful purpose in showing how things have been going with the business, and the function of Parliamentary Statutes and the Courts should be to help, and not to hinder. One accountant did suggest that the practice of inserting these comparative figures might be open to abuse, by the insertion of figures for a previous period which might not be strictly comparable, inasmuch as an auditor's certificate would not cover comparative figures taken from a previous year's accounts. But, as he added, "even so, the facts would be easily verifiable by reference to the former balance sheet, and the danger of deception would be most remote." We note with satisfaction the declaration of yet another accountant that his firm recommend their clients to insert the previous year's figures in their balance sheets—clearly shown as such—as being both informative and useful. He would be "absolutely staggered" to hear that there had been any legal decision to the contrary, and we, taking the standpoint of the shareholder, would feel most profoundly sorry.

The Nature of Coal

It is an established principle among chemists that a material cannot be handled to the best advantage until its composition is known. It is doubtful whether chemists handle any material to the same extent as coal. The work of the gas and coke oven industries is essentially the chemical treatment of coal, and unless the coal is subjected merely to burning it is difficult to think of any use of coal in which the chemist has not to play an important part. It cannot be denied that even the combustion of coal is a chemical process, so that directly or indirectly chemistry enters into the use of every piece of coal that is mined. The constitution of coal, however, has been one of those subjects upon which a great deal of research has not taken us very far. We have attacked the problem by thermal decomposition, and we have attacked it by the use of solvents. Not infrequently the investigators have not approved of each other's methods or conclusions. An important fact is that hitherto the constitution of coal has been examined by subjecting a wide range of coals to a standard procedure. There is another way in which coal can be investigated, which is by subjecting one coal to every conceivable chemical and physical process which seems likely to yield any useful information. This method, so far as we are aware, seems to be employed only at one place—the Coal Research Laboratory of the Carnegie Institute of Technology, which was opened 7½ years ago. The necessary finance has been supplied principally by industrial firms, and considering that this work appears on the surface to be largely what is known as "pure research," this fact is an outstanding expression of the growing feeling among industrialists that pure research, no less than applied research, leads to sound business and financial advantages. Among the sponsors of the work are twenty coal-mining companies, three railways carrying coal, and the National Coal Association of the U.S.A. Already the average annual income of the laboratory of £16,000 is assured until the end of 1940.

The single problem upon which this great organization is, and has been, working is the mechanism of the thermal decomposition of one particular coal from the Pittsburg seam; this problem was chosen because, in every use, coal is submitted to the action of heat. In the first five years, as the result of 120 man-years' work, certain conclusions were reached which are now being tested by including in the programmes three other coals differing in rank and type. Three major lines of attack have been used. The elucidation of the chemical constitution of the selected coal has been attacked by the three methods of oxidation, halogenation, and hydrogenation. The effect of temperature is studied by solvent extraction, by distillation in vacuo, and at atmospheric pressure. The energy relationships in all these processes are also being studied. Each of these methods is again subdivided into others; for example, halogenation experiments involve addition, substitution, and rupture of carbon-carbon bonds, while in solvent extraction the laboratory is studying such variables as the chemical nature of the solvent (over 50 solvents have been used), the electrostatic effect of the solvent, the pure temperature effect, the particle size, and the nature of the products obtained under each of these varying conditions.

The work of the laboratory has shown a surprising contrast between the apparent physical heterogeneity of coal and its chemical homogeneity. This is important, and strange in view of the great differences in appearance and behaviour between durain and vitrain, for example, and of the fact that durain is virtually non-coking, whereas vitrain (and clarain) seems to be (or to contain) the coke-forming constituents *par excellence*. Whatever the mechanism of coalification from cellulose and lignin to anthracite, there seems to be no doubt that the process is characterized by increasing enrichment in ring structure. The sample of coal investigated has been described as a pile of fragments of wire netting containing on the average four to five hexagonal rings. At the junctions of three wires (*i.e.*, at the chemical linkages) there is a carbon atom, and where two wires join there may be carbon, oxygen, nitrogen, or sulphur. Carbonization technologists will appreciate the conclusion that since an increase in temperature causes an increase in molecular and atomic vibrations, depolymerization of coal by heat is analogous to shaking the pile of fragments. Mild shaking will loosen those fastened least firmly to their neighbours; an increase in vigour will tear the individual fragments apart. The action of solvents may be likened to a lubricant, if the forces holding the fragments together are likened to frictional forces. The units of which coal is composed may have been found to be most readily isolated by solvent extraction.

Halogenation, oxidation, and reduction reactions suggest that the coal used has a hydro-aromatic structure in which at least 85% of the carbon and all the nitrogen is in condensed ring structures. There is also indication that coal and the humic acids regenerated from it contain relatively stable oxygenated units. Accepting the value in phenolic solvents as the true molecular weight of the humic acids from coal, it has been concluded that the building units of coal are for the most part relatively small, but as the coals increase in rank the units increase in size and the coal decreases in reactivity. Does this conclusion hold also for coke? Are low-tempera-

ture cokes composed of small units and is the decreasing reactivity with increasing temperature the result of polymerization? The work of Prof. Riley at Newcastle does not negative this suggestion, and even gives it some support. It is not known how the "building units" are held together, but an ether-linked structure is indicated.

The value of hydrogenation as a tool in research into the constitution of coal is primarily because the nature of the catalyst employed is such that it is particularly effective in breaking cyclic and linear ether-oxygen structures, since the moderate temperatures used preclude appreciable degradation of hydrocarbon structures and because over 80% of the carbon in the original coal is converted into oil. The oils produced by hydrogenation are believed to be fundamental units of the coal. The results of hydrogenation research indicate that the benzene insoluble and soluble portions of this coal differ more in the size of the polymeric aggregate than in the essential chemical structure. The Fuel Research Board is now using hydrogenation to attack the structure of coal. These American investigations all support the view that this particular coal is a natural polymer built of units containing on the average four or five condensed rings in which both the oxygen and the nitrogen and part of the sulphur of coal are contained.

Elementary hydrogen appears to be one of the primary products of the thermal decomposition of coal, and is probably derived from hydro-aromatic nuclei. A very interesting observation is to the effect that in one coal tested the entire effect of the rate of heating on the yields was confined to a small temperature range between 200° and 390° C.

It is of particular interest that this highly academic research, which for many years has been virtually confined to one particular coal in a large field, is supported primarily by the great industrial undertaking of the district.

We may look forward to methods for the sub-division of the constituents of coal so that each may be put to its proper use. Already the mining industry is beginning to see that to charge for coal on the basis of size is not defensible. The increasing knowledge that is being gained on appliances in which coal is used is beginning to show that any particular size of coal can be used just as efficiently as any other size provided the right appliance and the right method of treatment are selected. The smallest size of coal can be carbonized and can yield valuable results. Each of the other sizes can be burnt or utilized in proper appliances efficiently. Already the mining industry is beginning to break down the large coal and to sell a properly sized material in its place. The Fuel Research Board is investigating the best method of doing this. It seems to be only a step, therefore, to the conclusion that coal should be sold on a calorific value, or similar basis, and not according to size, except that possibly the small material under half-an-inch may be considered as of somewhat less value than the remainder, since its use is virtually restricted to carbonization unless it is made suitable, at additional expense, for powdered fuel firing. We believe that the fundamental researches that are now being conducted into the constitution of coal will lead to remarkable advances in the technology of coal utilization.

Who Has a "Gas Gazette"?

Last week's issue, introducing a number of changes in our shape, style, and make-up, contained an article entitled "Ninety Years of Progress," in which we traced our direct descent from the father of all gas papers—the *Gas Gazette*. As far as our records show, this paper appeared in 1847 only, after which there was a gap of a whole year before we first came out in February, 1849.

Our article has brought an enquiry from an old friend who would like to obtain a volume of the *Gas Gazette*. We ourselves unfortunately have no spare copy, but for all we know there may be several stored away in odd places. We should be pleased to hear from any reader who can put us in touch with one.

Gas at the Physical Society's Exhibition

The young research chemist of to-day is very often the industrialist of to-morrow, and his conception of our Industry in later life may largely depend on experience of gas equipment in his student days. Moreover, even his choice of fuel for industrial processes can be greatly influenced by his early experience of gas or electricity. This is one outstanding reason why the Gas Industry owes a debt of gratitude to the Gas Light and Coke Company and other stalwarts for their continued annual participation in the exhibition of scientific instruments which is held annually by the Physical Society. It also supplies a complete answer to those who may wonder why the Industry should be really interested in an exhibition of this kind since it might well be argued that the load represented by gas consumed in scientific instruments is negligible. Time was when electricity predominated at this exhibition, but now, thanks to the work undertaken at the Industrial Laboratories of the Gas Light and Coke Company, modern gas scientific instruments are to be seen on the stands of a number of firms who had found previous existing gas equipment lacking in appeal. That appeal was much in evidence at the Company's exhibit, where despite many counter attractions, a great number of visitors found it both pleasant and profitable to linger.

Coke Sales in Australia

We have for long emphasized the great advantage the Gas Industry possesses in being purveyor of two smokeless fuels, one in gaseous and the other in solid form. It will be recalled that in his Paper at the Institution Meeting last June Mr. C. F. Broadhead, of Melbourne, expressed the opinion that the cultivation of the domestic coke field should be abandoned, with the possible exception of blocks of flats, where labour has to be employed in any case. Advocating complete gasification, he explained that since 1926 about 50,000 tons of coke per annum have been taken off the local market. It is interesting to turn to the Presidential Address of Mr. H. Wood, of the Australian Gas Light Company, which he recently delivered to the Australian Gas Institute. His view is that in every instance in which gas is unable to obtain a potential, or retain an existing, consumer on account of cost, the Gas Industry should hold the field against all comers by taking advantage of its "most valuable possession"—the ability to supply both gas and coke. Mr. Wood points to the fact that in Australia 80% of the population is in receipt of an income of less than £5 per week, and 78·5% of less than £4 per week. The important factor is the amount that the majority of the population, those earning up to £4 5s. per week, can afford to spend on fuel. Mr. Wood is going out enthusiastically for the coke market, and is installing complete coke cutting and screening plant which, he suggests, will "compare more than favourably with plants observed abroad." There is much point in Mr. Wood's contention that we should regard our progress not by sales of gas alone, but by the total heat values supplied in gaseous and solid form and be prepared to supply in the form desired. He regards the future prospects of coke sales as being excellent. Considering the way he is setting out to cater for the market, we are sure his optimism is justifiable. Mr. Wood, by the way, strongly recommends the formation of a National Coke Association in Australia to deal with the preparation, utilization, and sales of coke in the various States. The experience of the London and Counties Coke Association would help if action was taken on this recommendation.

The "Forgotten Man"

Some interesting comments, too, are made by Mr. Wood on the influence of the gas engineer on the sales of gas. His contention is that so much attention has been given recently to service to consumers, customer contact, salesmanship, advertising, and so on, that the engineer is becoming the "forgotten man." It is not until profits show a decline, or that he requires money for ex-

tensions to works, that any real notice is taken of him. "In the past," says Mr. Wood, "the engineer has been so engrossed in his work as to care little for publicity, but he now finds that he will have to assert himself in order to be recognized. The fact that upon his skill and attention to details in construction and manufacture a cheap and reliable product is available is often overlooked. After all, what is the use of all the various departments without a product that is competitive with other forms of heat? . . . It has been stated on many occasions that, as works practice has attained a very high degree of efficiency, little further can be expected from the manufacturing side." Mr. Wood definitely contradicts this statement, and we believe, too, that much further can be done. Economies effected in the cost of manufacture become all the more important with increasing costs of labour and materials. Competition is such, however, that even a cheap and reliable product will not sell itself. Expenditure on selling is essential; the fact is that until comparatively recently this branch of the Industry's activities was sadly neglected.

Letters to the Editor

The "JOURNAL"

SIR,—

You are old, Father "JOURNAL," the Industry said,
And your hair is exceedingly white;
Now it seems you're proposing New Measures to tread;
Do you think at your age it is right?

With apologies.

I have before me the *Journal of Gas Lighting, Water Supply, and Sanitary Improvement* of Jan. 2, 1872—sixty-six years ago, and it was then issued fortnightly.

Glancing through its pages, I find that Sir John Rennie's Inauguration Address as President of the Institution of Civil Engineers ran to "100 pages"; that "The Gas-Works Amendment Act" became operative; there was arbitration between the Ryde Gas Company and the Corporation (this covers eleven pages, and is "continued in our next"); the "South Metropolitan" were amalgamating "The Phœnix Gas Company"; the Barnet Gas Company were adopting a "Patent Gas," and the Chairman is reported saying:

> "The Barnet Gas Company was a very popular Company, as supplying the best gas, and although this was a disadvantage to his Company, he (the Chairman), speaking for the Directors, was not in the least afraid of the comparison which should be instituted. He had himself, so recently as twelve o'clock the previous night, seen the gas burning in a friend's drawing-room, and it was so beautifully brilliant that in any part of the room you could thread a needle with the smallest eye. The works were now nearly finished and it was the object of the Board to make them such a commercial success and profitable undertaking that it would become a necessity for all the gas companies to take the matter up."

The Braddock family of Oldham had many interests and their "gas stoves" appear to have been superior to the appliances we are now acquainted with—viz.:

> "One of the most interesting appliances to the Infirmary, and which attracted the attention of numerous visitors, more especially the ladies, was the gas cooking apparatus on improved principles, manufactured and presented to the Institution, by Messrs. J. & J. Braddock, of the Globe Meter-Works, Oldham. It consists of a cooking range of two ovens, grate for boiling, and hotplate. At one time there were cooking a large piece of beef, three or four legs of mutton, a turkey and fowls, and game innumerable. They were placed on shelves one above the other, inside the oven or roasters, and cooking went on steadily from beginning to end, and all done to perfection. At the same time, over the boiling grate were boiled a turkey, legs of mutton, ox-tail soup, and vegetables. When the meat was cooked, it was placed on the hotplate over the oven, ready for dishing up; and the whole was conducted by one person, without any excessive heat or fatigue, and with remarkable cleanliness, and, as we are informed, at very little cost. The additional weight of meats, gravies, and drippings will, we are assured, more than pay for the cost of gas used in cooking."

Ossett and Huddersfield were negotiating for the purchase of their respective gas-works.

The issue contained two full pages of patents relating to gas: six pages of "Share List of Gas and Water Companies"; along with thirteen pages of advertisements. Among the latter, "Raikes Hall Gardens," at Blackpool, required a gas-works (Belle Vue Gardens, Manchester, already had one), and, to my surprise, "Newbigging's Handbook" could then be obtained from Walter King, price 7s. 6d.

All the illustrations are from wood block, and 50% of the advertisers are still represented in your current issue. The type you used was very small, and I wonder how our forebears were able to read it without spectacles, but your father was justifiably proud of his production, and was always the busiest man at the old Institution gatherings.

From the foregoing, I think you will agree that there is little in our Industry to-day with which our forebears were not acquainted.

Yes, I like your new layout, type, paper, and the wonderful illustrations, and may you be enabled to carry on the work of the "GAS JOURNAL" for many, many years to come.

Yours, &c.,
J. W. SCOTT.

Jan. 10, 1938.

Future Orientation of the Gas Industry

SIR,—One cannot help but be appreciative of anyone who will stimulate thought in connection with methods of gas production and distribution within the Gas Industry. Gas engineers are receptive of revolutionary changes which can be justified in their practicability and cost.

The article which appeared in the "JOURNAL" on Jan. 5 entitled "The Future Orientation of the Gas Industry" is worthy of the fullest consideration, if only because it will either confirm or kill a much discussed suggestion that has been before the Gas Industry for some time.

Before this matter can be discussed much further, there are two points the writer would like to have cleared up. The first is that one must insist that the claim that a 200 B.Th.U. gas can be produced for 1d. a therm, purified, into holder should be substantiated with as much clarity and detail as were put forward by both Mr. Stewart and Mr. Hunter in the Papers that have been quoted. It is unlikely that under similar conditions of production, say at Beckton, suitable slightly coking coals can be obtained at a lower cost than coal is delivered at Beckton to-day. If that be the case, then it is unlikely that the cost of coal in the production of the gas in question would be less than 1½d. a therm.

The second point that one would like to see cleared is what suggestions has "M.Inst.Gas E." to put forward in the event of the gas profession accepting that all his contentions are right, in bringing about the transition from the present type of gas to the new gas. Millions of capital have been expended on equipment that is suitable for to-day's gas and entirely unsuitable for the 200 B.Th.U. gas.

Without elaborating this point, one can leave it to "M.Inst.Gas E." to explore the procedure which would have to be adopted to bring about any radical change.

Yours, &c.,
"DOCTOR OF PHILOSOPHY."

Jan. 10, 1938.

Hard Pitch as Boiler Fuel

SIR,—We have read with considerable interest the section headed "Tar and Tar Products," of your Review of 1937, in the issue of the "JOURNAL" for Dec. 29 last. We should like to refer to the last paragraph of this article, in which you mention hard pitch as a boiler fuel.

It might interest you to know that during the autumn of 1936, this Company, in conjunction with Messrs. Alfred Herbert, Ltd., of Coventry, investigated the combustion of special hard pitch (termed low ash fuel) in pulverized form, and as a result a battery of three Lancashire boilers at one of this Company's works was equipped with pulverizing plant, and has been consuming this type of fuel ever since.

As a result of the complete success obtained with this installation, considerable quantities of the material have been sold to various consumers for use in furnaces of different types.

We feel that this method of consuming pitch will go a long way towards the solution of the difficulties occasioned by the present and probable future overproduction of pitch.

Yours, &c.,
For The Midland Tar Distillers, Ltd.,
STANLEY ROBINSON,
Vice-Chairman.

Oldbury, Birmingham,
Jan. 7, 1938.

News of the Week

To Various Charities, the employees of Airdrie Gas Department contributed £33 during 1937.

The Telephone Number of the Institute of Fuel will be Abbey 1735 on and after Jan. 17. The address is unchanged.

For New Showrooms at Billingham, the Stockton-on-Tees Town Council have purchased a site. The cost of the premises will be met out of revenue.

An Offer by West's Gas Improvement Company, Ltd., for the resetting of certain vertical retorts has been accepted by the Motherwell Town Council.

To Empower the Council to purchase lands for the purposes of their Gas Undertaking is one of the objects of a Special Order for which the Rothwell (Northampton) Urban District Council intend to apply to the Board of Trade.

An Operation was in progress at the North Ormsby Hospital, Middlesbrough, on Jan. 10, when the electricity supply failed. The surgeon had to complete his work with emergency lighting, while candles and torches were requisitioned for the wards.

With the Object, among others, of authorizing the Company to supply gas within certain areas, the Berwick and Tweedmouth Gaslight Company are applying to the Board of Trade for a Special Order under the Gas Undertakings Acts, 1920 to 1934.

Application for a Special Order under the Gas Undertakings Acts, 1920 to 1934, is intended to be made to the Board of Trade by the Newton Abbot and District Gas and Coke Company, Ltd., with object, *inter alia,* of authorizing the Company to supply gas within specified areas.

The Next Meeting of the Southern Association of Gas Engineers and Managers [Eastern District] will be held at Gas Industry House, 1, Grosvenor Place, S.W. 1, on Thursday, Jan. 27, at 2.30 p.m., when the subject for discussion will be "Some Notes on Works Practice." A Committee meeting will be held on the same day at 12 noon.

Work on Kirkcaldy's Gasholder is to re-start this month. After 12 months' controversy work had no sooner been started than it was suspended owing to the fact that steel plates were unavailable, priority being given to Government armaments contracts. The Council has now been informed that production of special plates will be resumed.

Prior to His Visit to the Birmingham Section of the B.I.F., which we have already announced, the Duke of Kent will be principal guest at the Birmingham Chamber of Commerce annual banquet on Feb. 28, at which the Earl of Dudley, President of the Birmingham Chamber of Commerce, will preside. The guests include the French Ambassador and the President of the Board of Trade.

The Street Lighting Committee of Blackburn Corporation recommend that the Borough Engineer, in collaboration with the Gas and Electrical Engineers, prepare a report on street lighting to incorporate present lighting costs; estimated capital cost of improving the present lighting to the appropriate standard by gas and electricity; and the estimated cost of annual maintenance, renewals, and repairs.

The Sandwich House, one of the many happy suggestions given in a Radiation booklet, was featured in the Local Press late last year by the Barbados Gas Company, with the announcement that a copy of the booklet would be given free with every cooker purchased before Christmas, together with a surprise gift. This is further evidence of the active publicity measures pursued by the Engineer and General Manager, Mr. J. W. Brown.

The Presentation of Hampers awarded in connection with Christmas sales was made recently by the Engineer and Manager, Mr. J. Hunter Rioch, at the showrooms of the Cambridge University and Town Gas Light Company. Mr. Rioch observed that the competition had proved very keen indeed, there being a margin of only three points in one section. Although one hamper only had been offered for competition among the sales staff, efforts had been so worthy that an additional award had been made. Mr. T. Firman led this section, followed by Mr. W. R. Robinson, and the hamper offered in the contest restricted to those on the District was carried off by Mr. S. Halls, the runner-up being Mr. F. Halcrow. A further hamper was provided by Electrolux, Ltd., for the highest refrigerator sales. This was won by Mr. C. Hunt.

Members of The Institution of Gas Engineers will be welcome at a Joint Meeting of the Institution of Civil Engineers and the Institution of Chemical Engineers on Tuesday, Jan. 18, at 6 p.m. at the Institution of Civil Engineers, Great George Street, S.W. 1, when a Paper will be presented by Dr. A. Parker, Assistant Director of Water Pollution Research, Department of Scientific and Industrial Research, on "The Treatment and Disposal of Trade Waste Waters."

A New Gasholder is being considered by Birkenhead Town Council. The Gas Committee have recommended the erection of a 3 million cu.ft. gasholder at the Corporation's Works at a cost of £70,439, and the acceptance of the tender of Messrs. Ashmore, Benson, Pease, & Co., Ltd., Stockton-on-Tees. The Committee also recommend that application be made to the Ministry of Health for approval to borrow £11,500 in addition to the £60,000 already sanctioned in connection with the scheme.

For Demonstrating Carbonization model apparatus can now be hired or bought from the British Commercial Gas Association, Gas Industry House, Grosvenor Place, S.W. 1. This is particularly useful when children visit Gas-Works and similar occasions in assisting undertakings to make our future consumers "gas-conscious." It is estimated that six million children, about 15% of the total population, attend educational establishments. The model consists of a vertical retort, tar well, condensers, washer, scrubber, purifiers, meter, and gasholder. It is available with or without the meter. As the holder is graduated, the rate of production of the gas can be demonstrated without a meter.

Asked Whether Increased Coal Costs were likely to have any effect upon municipal gas charges, Ald. J. Clifford Tozer, Chairman of the Plymouth Corporation Gas Committee, said that every endeavour was being made to maintain the price at its present low level. "We have hopes," he said, "in view of considerable foresight in the past in the fixing of contracts for the purchase of coal that we shall be able to maintain that price. I see no likelihood of any increase in the price of gas in the near future as far as the Plymouth Corporation Undertaking is concerned." Mr. Frank J. Leatherby, Chairman of the Plymouth Electricity Committee, said that the increase in the price of coal was one of the things which the Committee would have to go into soon.

Amalgamation and Grouping

United Kingdom, Rossendale, Littleborough, and Knottingley.

Close Brothers, Ltd., Secretaries, announce that the United Kingdom Gas Corporation has just purchased controlling interests in three more gas undertakings—*i.e.*, Rossendale Union Gas Company, Littleborough Gas Company, and Knottingley Gas Company.

A substantial proportion of the purchase consideration for the above acquisitions was satisfied by the allotment of Ordinary Shares of the Corporation, in the case of Littleborough the transaction being effected entirely by an exchange of shares. Rossendale and Littleborough will add to the Corporation's group in Lancashire, the former adjoining the area of Ramsbottom Gas Company, another Subsidiary Company. Knottingley represents the twenty-first gas undertaking in Yorkshire to be acquired by the United Kingdom Gas Corporation, and increases the total number of undertakings under the direct control of the Corporation to forty-four.

As a result of these acquisitions the issued capital of the Corporation is now as follows:

	£
4 % First redeemable cumulative preference shares of £1 each	519,571
4½% First cumulative preference shares of £1 each	991,485
4½% Second non-cumulative preference shares of £1 each	745,263
Ordinary shares of £1 each	1,029,954
3½% Debenture stock	1,000,000
	£4,286,273

Coatbridge and Airdrie.

Following the offer of Coatbridge Gas Company to purchase the Airdrie Gas Undertaking, Airdrie Town Council have agreed to ask Mr. J. F. Ronca, O.B.E., A.R.S.C., Director of Gas Administration, Board of Trade, to suggest a suitable expert on gas-works valuation who might be prepared to advise the Town Council on the value of their undertaking and on the offer which had been received.

Personal

Mr. C. H. TAYLOR has resigned from the position of Engineer and Manager of the Swadlincote Urban District Council's Gas Department.

* * *

On the occasion of his retirement from the position of Manager of the Haddington (East Lothian) Gas Company, Mr. J. BLAIR was recently presented by the employees of the Company with an inscribed gold watch.

* * *

Mr. W. ROY WELDON, of the Hartlepool Gas and Water Company, has been appointed Assistant Meter and Fitting Superintendent to the Oriental Gas Company, Calcutta. He leaves England to-day to take up his new appointment.

* * *

At a meeting of the Manchester City Justices Gas Meter Testing Committee, held on Jan. 10, Mr. H. N. BARROW was appointed Chairman for the eighteenth successive year.

Obituary

The death occurred on Dec. 31, 1937, of Mr. CHARLES EDWARD THOMAS in his eightieth year. Mr. Thomas was connected with the firm of Metters, Ltd., Australian Merchants.

Forthcoming Engagements

January

13.—**Midland Juniors.**—Meeting and Paper by A. T. Green.
15.—**Scottish Western Juniors.**—Debate meeting.
15.—**Yorkshire Juniors.**—Meeting at Leeds. Paper by W. S. Hubbard, "Choice of Gas Storage."
17.—**L.C.C.A.**—Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
18.—**I.G.E.**—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
18.—**London and Southern Juniors.**—Meeting and Paper by R. T. d'Eyncourt, "Load Value of Appliances as a Guide to Sales Policy."
19.—**B.C.G.A.**—Executive Committee, 11.30 a.m.; General Committee, 2.30 p.m., Gas Industry House.
20.—**S.B.G.I.**—Council Meeting, 2.30 p.m.
22.—**Western Juniors.**—Meeting at Weston-super-Mare. Paper by A. G. Holtham, "Rural Gas Services."
26.—**B.C.G.A.**—Annual Meeting of Members in Northern District, Newcastle-upon-Tyne, 3 p.m.
27.—**Midland Juniors.**—Visit to Docker Bros., Paint and Varnish Manufacturers, Birmingham.
27.—**Southern Association of Gas Engineers and Managers (Eastern District).**—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Some Notes on Works Practice." Committee, 12 noon.
27.—**B.C.G.A.**—Annual Meeting of Members in South Wales District, Cardiff, 3 p.m.
28.—**I.G.E.**—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
29.—**Scottish Western Juniors.**—Visit to Glasgow Corporation Lighting Department.

(There will be no meeting of the Central Executive Board of the National Gas Council or of the Central Committee of the Federation of Gas Employers during the month of January.)

February

1.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
1.—**B.C.G.A.**—Annual Meeting of Members in South-Western District, Exeter, 2.30 p.m.
2.—**London and Southern Juniors.**—Visit to Watson House.
3.—**Midland Juniors.**—Meeting and Paper by G. Bakewell, of Birmingham, "The Sale of Coke for Domestic Purposes."
3.—**B.C.G.A.**—Annual Meeting of Members in Midland District, Birmingham, 2.30 p.m.
5.—**Scottish Eastern Juniors.**—Short Paper Meeting at Dunfermline.
5.—**Manchester and District Juniors.**—Meeting at Blackpool. Paper by T. V. Blake, "A Six Years' Period Prior to the Removal of Blackpool Gas-Works."
7.—**London and Counties Coke Association.**—Technical Committee, Gas Industry House, 2.30 p.m.

February 21-March 4.
British Industries Fair, Castle Bromwich.

Feb. 24.—Joint Visit of Junior Gas Associations.
Feb. 25.—Joint Visit of B.C.G.A. Salesmen's Circles.
Feb. 28.—Visit of Women's Gas Council.
Mar. 1-3.—Joint Gas Conference.

Physical Society's Exhibition

That the Gas Industry is playing its part in present-day scientific development was well illustrated by the interesting display staged by the Gas Light and Coke Company at the twenty-eighth annual exhibition of scientific instruments and apparatus held under the auspices of the Physical Society from Jan. 4 to 6 at the Imperial College of Science and Technology. The exhibit of the Company included an improved muffle furnace for laboratory use, sand-bath providing a varying temperature along its length, and modern crucible furnace. Among the demonstrations of general appeal which drew many interested visitors to the stand was the automatic ignition of gas appliances; the exhibit illustrated the recent development of gas ignition with platinum catalysts and also showed some alternative methods of ignition. A model catalyst was shown and its mode of action was described. The effect of the composition of the gas mixture on the ignition process was illustrated by a model which could be operated by the visitor. Catalytic ignition as applied to the gas fire was also demonstrated, its action being observed through a transparent front on the housing. Other forms of automatic ignition exhibited included permanent pilot, flint, and hot wire. Another feature of interest to the maker of scientific instruments was the new suction pyrometer for the accurate determination of gas temperatures up to 2,000° F. This design embodies the following points: An easily replaced immersion tube of refractory material to carry the couple leads; any required length and shape of tube may be used; stainless steel suction head with cooling fins to prevent overheating; and the thermocouple leads have a simply made electrically insulated gas-tight joint where they emerge from the suction head.

Among firms of interest to the Gas Industry at the exhibition were the Cambridge Instrument Company, Ltd., George Kent, Ltd., and Rotherham & Sons, Ltd. Exhibits on these stands included an addition to the range of ring balance meters—Kent's recording ratio flow controller, which is intended either for blending different gases in any desired ratio or for proportioning gas and air for best combustion conditions. Rotherham & Sons showed a variety of mechanical time lags, escapements, industrial clocks, and pressure gauge movements.

A Christmas Window Display

This novel window display was arranged by the North Middlesex Gas Company for the Christmas season.

Chemists in Industry

An innovation is announced by the Society of Chemical Industry. It is stated that, as there are so many specialized sections of applied chemistry which are on the fringe of the work of the Society's subject groups, such groups are to be allowed to form panels with the object of catering for those chemists whose work is so specialized.

The first panel to be formed deals with microbiology as applied to all industries utilizing micro-organisms—*e.g.*, food, agriculture, dairy, leather, and the fermentation industries. At the same time, the panel will deal with the prevention of micro-organisms, and such subjects as the microbiological spoilage of any raw or manufactured materials will figure in the discussions. The subjects of the panel meetings in some cases will have broader aspects than the merely chemical, such as, for instance, marketing, finance, and advertising. Panels dealing with aspects of the activities of other groups are now in the course of formation.

Better Salford Street Lighting

By the spring of 1939 all the streets in Salford which are lighted by gas will have an improved standard of lighting for the Light, Heat, and Power Committee, with the approval of the City Council, is spending £24,000 to modernize the whole system.

Lamps are being equipped with clock controllers and additional mantles. Three thoroughfares carrying tram routes are illuminated by gas and these, as well as seven miles of 'bus routes, have been equipped with suspension type lamps. A further 20 miles of thoroughfares bearing heavy traffic have standards 18 ft. high and 16 ft. high standards have been placed along another 21 miles of roads and streets carrying less traffic. The remaining 130 miles of gas-lighted streets will be equipped with 15 and 11 ft. standards according to the importance.

Darlington New Scale of Charges

A new scale of block rates for gas to date from the quarter beginning Oct. 1 has been approved by the Darlington Town Council.

As a result of this decision large consumers of gas, in particular, will benefit. The reductions since March 31, 1936, have represented a saving to the domestic consumer of £5,000 a year, but the industrial consumer has had no concession. Under the new reductions a further £2,000 will be saved in which the industrial consumer will participate. Had the Council not proceeded with the purchase of coke oven gas it would have been necessary, due to the increase amounting to £8,000 in the cost of coal, to increase the gas charges by 3d. per 1,000 cu.ft. to avoid financial loss.

Private Bills to be Introduced in 1937-38

A *Precis* of the Clauses Affecting Gas Interests.

For the Parliamentary Session 1937-38 sixty-three Private Bills have been deposited, and in accordance with our usual custom we append brief comments on these Bills in so far as they appear to be of interest to the Industry.

Birkenhead Corporation.

This Bill seeks to confer upon the Birkenhead Corporation further powers with regard to residuals. The Bill also would impose penalties upon persons fraudulently obtaining gas from a prepayment meter.

Bournemouth Gas and Water.

This Bill authorizes the purchase of the Brockenhurst Gas Company and of the Wareham and District Gas Company by the Bournemouth Gas and Water Company and extends the area of that Company in order to enable it to supply the districts formerly served by the two Companies which it will acquire. The Bill also increases the capital and borrowing powers of the Bournemouth Company.

Bradford Corporation Extension.

This seeks to extend the gas limits of the Corporation to enable them to supply the area of the Shipley Urban District Council whose gas undertaking the Corporation will acquire.

Brixham Gas and Electricity.

The Brixham Company are promoting a Bill to authorize the raising of additional capital.

Canterbury Gas and Water.

The purpose of this Bill is to authorize the conversion of the existing share capital of the Canterbury Gas and Water Company into consolidated ordinary stock. The prescribed standard rate of dividend upon the consolidated stock is to be 4%.

The maximum amount of dividend which the Company may distribute is to be calculated (*a*) in respect of the gas capital in accordance with a Sliding Scale, and (*b*) in respect of the water capital at the standard rate. The Canterbury Company are also seeking power to borrow money on temporary loans by means of overdrafts or by the issue of notes or bonds of a currency of not less than 5 years and of not more than 10 years and to draw, accept, and endorse bills of exchange or other negotiable instruments.

Clacton U.D.C.

This Bill is promoted for the purpose of extending the powers of the Clacton Gas Department to supply gas in bulk and conferring various other powers upon the Council.

Cowes U.D.C.

This Bill proposes to empower the Cowes Council to recover special charges for the reading of meters at times other than those of the usual periodical readings.

Lancashire C.C. (Rivers Board and General Powers).

A new Board to be known as "The Lancashire Rivers Board" is constituted by this Bill. The function of the Board is to prevent the pollution of streams within the County.

Ossett Corporation.

The object of this Bill is to modify an agreement between the Corporation of Ossett and the Urban District Council of Norbury which is scheduled to the Ossett Corporation Act, 1900. Under this agreement the Norbury Urban District Council are entitled to a specified share in the profits of the Ossett Gas Undertaking, but in computing the amount of the profit to be divided the Ossett Corporation are not permitted to deduct the sinking fund contributions which the Ossett Corporation are required to make. The result is that substantial contributions have been made by the Ossett Corporation to the Norbury Council although the Ossett Gas Undertaking may have been run at a loss. The effect of the Bill will be to permit the Ossett Corporation in computing the amount of profit to be divided to deduct all the expenses of their Gas Undertaking, including sums to be provided for the reduction of gas charges in a following year.

Redcar Corporation.

Under this Bill the Redcar Corporation will be empowered to purchase and sell liquid butane or liquid propane which is intended to be converted into gas. The Bill will also confer upon the Corporation further powers to acquire showrooms and offices.

Romford Gas.

This Bill is for the purpose of authorizing the Romford Gas Company to raise additional capital.

Salford Corporation.

Several clauses in this Bill relate to the Salford Gas Department—notably the clause relating to the fraudulent abstraction of gas from prepayment meters.

Sheffield Gas.

This Bill proposes to change the name of the Sheffield Gas Company to "The Sheffield and District Gas Company." The Bill also seeks to extend the coke oven gas limits of the Company so as to include the County Borough of Doncaster and various areas in the administrative counties of the West Riding of Yorkshire, Derby, and Nottingham (including the boroughs of East Retford and Worksop).

The Bill would apply all the provisions of the Sheffield Gas Act, 1931, to the additional coke oven gas limits. The Bill also proposes to extend the limits for the supply of gas by the Company to include the parish of Orgreave in the rural district of Rotherham, within which area the basic price is to be sevenpence per therm.

The Bill would also authorize the Company to establish a depreciation fund in respect of the works which may become unnecessary owing to the fact that the Company is taking a supply of coke oven gas. This fund may be applied in writing off unproductive capital or in the purchase of ordinary shares or stock or debenture stock of the Company.

West Yorkshire Gas Distribution.

This Bill proposes to incorporate a new Company to be known as the West Yorkshire Gas Distribution Company having an authorized capital of £750,000. It is proposed that the Company should be entitled for a period of five years from its incorpora-

tion to pay interest out of capital and to charge to capital account the interest accruing on borrowed money.

The proposed area of supply of the Company includes a large part of the West Riding of the County of York and parts of the North-East Ridings of that County, but the Company is only to supply gas to statutory and non-statutory undertakers. Further, no supply is to be given to a non-statutory undertaker for use within the limits of a statutory undertaker. The Company would be authorized to enter into agreements with persons producing gas within the limits of supply whereby the Company could purchase gas from such persons. The Company would also have power to make agreements with persons entitled to give a supply of gas whereby should persons take a supply of gas from the Company such agreements may provide that the Company may, in any agreement entered into with a statutory undertaker, provide that the Company may execute any works in connection with the supply of gas within the limits of such statutory undertaker.

The Company would be prohibited from supplying gas containing carbon monoxide unless such gas possesses the distinctive pungent smell of coal gas.

Clause 72 of the Bill provides that except for certain of the provisions of the Gas Undertakings Acts, 1920 to 1934 the Company are not to be deemed to be "gas undertakers," "undertakers," or "thermal unit undertakers" within the meaning of those Acts.

Workington Corporation.

Certain provisions relating to the surplus gas revenue of the Workington Corporation are contained in this Bill. It is provided that if the revenue of the Gas Department exceeds certain payments and expenses and any deficiences in the revenue of the Gas Department which have arisen during the preceding five years and have not been made good, then a sum equivalent to the amount of the excess is to be credited to the revenue account of the gas undertaking of the next succeeding year and the charges for gas are to be reduced by an amount as nearly as reasonably practicable equivalent to the amount of the excess.

ELECTRICITY BILLS.

Certain of the Electricity Bills deposited may be of interest to the Industry, these being mainly concerned with such questions as amalgamation and joint working. Details of these will be given next week.

Woodall-Duckham's Work in 1937

A Year of Unprecedented Activity

The Woodall-Duckham Company has once more in 1937 experienced a year of record activity. The aggregate capacity of W-D carbonizing plants ordered during the year amounts to over 2,660,000 tons of coal a year, which exceeds by nearly 600,000 tons the highest figure attained in any other year.

Plants started up during the year have an aggregate capacity of over 2,250,000 tons of coal a year, while plants are under construction with an aggregate capacity of 3,020,000 tons of coal a year, both these figures being unprecedented in the Company's history.

The Company has received orders for new W-D continuous vertical retort installations from the gas undertakings in the following cities and towns in Great Britain:

London (Gas Light and Coke Company, 8th installation, Kensal Green Station; 371 tons of coal per day); Lincoln (2nd installation, 72 tons per day); Penzance (30 tons per day); Wellington, Salop (3rd installation, 38 tons per day); Hessle (24 tons per day); Stockport (3rd installation, 96 tons per day); Grimsby (2nd installation, 32 tons per day); East Dereham (12 tons per day). The Company's French associates, the Compagnie Generale de Construction de Fours, have received an order for a second installation of W-D continuous vertical retorts for Rome (304 tons per day). Orders have been received for the complete reconstruction to modern upwardly heated retorts of downwardly heated installations at Stockport (two installations, 96 tons per day each); Edinburgh (468 tons per day); Neath (31 tons per day); Hyde (79 tons per day); Birmingham (Saltley Works, 426 tons per day); Luton (78 tons per day); and Strandvej (Denmark, 120 tons per day).

The new plant at Lincoln and the modernized plant at Edinburgh and one of those at Stockport are already in operation while in addition new installations have been put into operation during the year at Alloa (97 tons per day); Edinburgh (3rd installation, 280 tons per day); Elland (36 tons per day); Modderfontein (S. Africa, 16 tons per day); Prestatyn (17 tons per day); Dunstable (74 tons per day); Rowley Regis (2nd installation, 12 tons per day); and Warrington (3rd installation, 80 tons per day); and reconstructed and modernized plants at Hinckley (119 tons per day); Bradford (198 tons per day); Fulham (325 tons per day); Liverpool (180 tons per day); Rochdale (180 tons per day); and Birmingham (Swan Village Works, 144 tons per day).

Construction is in progress on other new plants at Cleckheaton (3rd installation, 52 tons per day); and Sydney (Australia, 210 tons per day).

Four new W-D intermittent vertical chamber plants have been ordered during the year, two by London gas undertakings—namely, the Commercial Gas Company (Poplar Works, 259 tons per day) and the Wandsworth and District Gas Company (3rd installation, 266 tons per day). Another large installation of this type has been ordered by the Portsmouth and Gosport Gas Company (Hilsea Works, 2nd installation, 309 tons per day), while the fourth order was for an extension to the chamber plant at Huntingdon (4 tons per day). Two W-D intermittent vertical chamber plants have been completed in 1937, one at Weston-super-Mare (109 tons per day) and the other at Epping (25 tons per day), both these plants and those being built at Poplar and Wandsworth being designed for non-recuperative heating.

The Southampton Gas Light Company has ordered an installation of W-D static vertical retorts (146 tons per day).

W-D waste heat boilers are included in the contracts for carbonizing plant at Kensal Green (3 boilers), Poplar (2 boilers), Wandsworth, Stockport, Wellington, Hessle, Neath, Penzance, East Dereham, Hyde, Portsmouth, Southampton, and Luton, and in addition a boiler has been installed at Ascot.

W-D Becker coke ovens have again enjoyed outstanding success in 1937, orders having been received for large and complete coke oven and by-product plants from Richard Thomas & Co., Ltd., for their Redbourn Works, Lincolnshire (1,750 tons per day), and from Colvilles, Ltd., for their Clyde Iron Works (1,630 tons per day). Extensions of existing W-D Becker oven batteries have been ordered by Guest Keen Baldwins Iron and Steel Company, Ltd. (Cardiff-Dowlais Works, 230 tons per day); Lancashire Steel Corporation, Ltd. (Irlam Works, 226 tons per day); and the Nunnery Coke and Gas Company, Ltd. (100 tons per day). In addition the Company has completed during 1937 coking and by-product plants for Brancepeth Gas and Coke (Strakers & Love), Ltd. (1,000 tons per day); John Lysaght, Ltd. (2nd installation, 520 tons per day); and the Waleswood Coking Company, Ltd. (267 tons per day); while oven batteries have been completed for Stewarts & Lloyds, Ltd. (2nd installation, 1,220 tons per day, and 3rd installation, 450 tons per day); and for the Nunnery Colliery Company, Ltd. (165 tons per day). Furthermore, a large coking and by-product plant ordered at the end of 1936 is in course of construction at the Ebbw Vale Works of Richard Thomas & Co., Ltd. (1,360 tons per day).

T.I.C. tar plants have been ordered by the Spalding Gas Department and by Geoffrey Turner & Co., Ltd., the former being designed for the treatment of crude continuous vertical retort tar at the rate of 15 tons per 24 hours to produce road tar and tar-bitumen mixtures, and the latter being a plant for the production of pitch, road tar, and fractionated oils for installation at the works of Shalimar Tar Products (1935), Ltd., and forming a duplicate extension of the T.I.C. plant installed at those works in 1933. The new plant is capable of treating 30 tons of crude coke oven tar per 24 hours.

For James Nimmo & Co., Ltd., of Auchengeich, a W-D wash-oil stripping plant has been put into operation, capable of dealing with 2,300 gallons of wash-oil per hour, the crude benzole being subsequently distilled in a W-D continuous rectification column (Barbet system) for the production of benzole and toluole fractions or motor benzole. A W-D continuous benzole plant (Barbet system) has been ordered by South Eastern Tar Distillers, Ltd., Tonbridge, to treat 5,000 gallons of crude benzole per hour for the removal of carbon disulphide and the production of motor benzole, a washer being provided for the chemical refining process.

TRADE NOTES

British Oxygen Co., Ltd. : New Telephone Number.

The telephone number of the British Oxygen Company, Ltd., has been changed to Victoria 8477.

W. J. Jenkins & Co., Ltd. : New Telephone Number.

The telephone number of the London office of Messrs. W. J. Jenkins & Co., Ltd., has now been changed from Victoria 1778 to Abbey 1778.

Thomas Broadbent & Sons, Ltd.

From Jan. 15 the telephone numbers of the London Office of Messrs. Thomas Broadbent & Sons, Ltd., 25, Victoria Street, Westminster, S.W. 1 (Entrance by Orchard Street), will be Abbey 2484 & 5, and not Victoria 3720.

Turners Asbestos Cement Company.

The selling organization of Tunnel Asbestos Cement Company, Ltd., was discontinued on Dec. 31 and the responsibility for sale and distribution of the products of that firm has been accepted by Turners Asbestos Cement Company, Ltd., Trafford Park, Manchester, 17. Future activities of the Tunnel concern will be vested solely in the manufacturing side of the business at their West Thurrock Works.

Waller Specialities.

An interesting brochure has recently been produced by Geo. Waller & Son, Ltd., entitled "Our Recent Activities." This firm has been established for well over a hundred years and since about 1855 has specialized in plant and machinery for gas-works. The present publication begins with a section devoted to exhausting machinery, including 4-blade exhausters, turbo machines, and improved Roots type high-speed exhausters and boosters. The next section goes on to deal with boosters, both turbine and electrically driven, which is followed by details of the firm's rotary compressors, which serve a wide field for high-pressure transmission; the firm supply compressors with capacities varying from 1,000 to 500,000 cu.ft. per hour, designed on the lines of their 4-blade exhausters, modified to work against increased pressures and suitable for boosting up to 5 lb. per sq.in. Vertical and horizontal reciprocating compressors also receive attention, as well as crankless types.

Other plant covered by the brochure includes various kinds of governors, pan ash separators, coke breakers, high-pressure gas storage plant of the type described by Mr. J. G. Cleator (Engineer and Manager of the Cirencester Gas Company) in the "JOURNAL" for Nov. 25, 1936, and, finally, waggon-tippers and screens. Copious illustrations of all the foregoing plant not only provide interesting examples of the latest gas-works apparatus but also make the brochure a most useful source of reference and information for the Gas Engineer.

Electricity in Gas Manufacture.

This note relates to the electrical installation at the Willoughby Lane Works of the Tottenham and District Gas Company, with particular reference to the manner in which Callender cables have withstood the peculiar conditions. These include dust and chemical fumes, and in some cases actual contact with naked flames.

Various types of cables were used for different sections of the plant, with fibre, special, and standard V.I.R. insulations. The whole of the mains and sub-mains are fibre insulated, lead sheathed, single wire armoured and taped cables, those in the boiler house being lagged to protect them from the heat liberated when the boiler flues are being cleaned. The largest sizes employed are 0·75 sq.in. single conductor and 0·3 sq.in. twin. The dynamo cables consist of two 0·75 sq.in. special insulated, taped braided and compounded in parallel, and the special type is also used for the signal lights and alarms on the coal-charging floor. On this floor the cables are subjected to much heat, flames from the retorts often actually touching the conduits into which the double braided and fireproof compounded cables are drawn.

On the charging car the insulation is standard pure and V.I.R., protected by a tape and braid painted with fire and weather-resisting compound. On the purifying floor the standard type was used, and standard V.I.R. taped and braided cables in galvanized conduits are adjacent to the coke conveyors which carry the coke from the retorts.

The cables were installed in 1933. All are still giving 100% service, despite the onerous conditions.

The Underpressure Engineering Company, Ltd.

The Ryde Gaslight Company recently decided that two miles of high-pressure 4 in. steel main were to be reduced to low-pressure supply. As it was impossible to reduce the pressure during consumption periods, this work would seem to have to be largely carried out at night, with attendant trouble and risk, because the job entailed taking out the existing high-pressure governors and replacing them with larger governors suitable for low-pressure work, together with the necessary syphons, &c.

These difficulties, however, were successfully overcome by the Underpressure Engineering Company, Ltd., 70, Victoria Street, S.W. 1, who, with their new patent safety tee, were able to insert four branches in the main without in any way interfering with the supply of pressure or use of high-pressure valves. The average time taken for the actual drilling was 20 minutes, and two of the tees were inserted at 2½ lb. and 4½ lb. pressure, respectively. The tees were afterwards tested to a normal working pressure of 7½ lb. to 8 lb., with the branches exposed to inspect the tees.

In each case the 4 in. by 7 in. gauge discs were withdrawn from the main inside the specially designed drill, leaving a full clear 4 in. by 4 in. branch connection on the main.

The work was carried out under the direction of Mr. F. W. Taylor, Engineer and Manager of the Ryde Gaslight Company, and Mr. A. Townley, of the Underpressure Engineering Company, took charge of the underpressure drilling, no gas escaping throughout the four operations.

The underpressure safety tee can be supplied either as a split tee or saddle branch. All sizes from 3 in. upwards are available —*i.e.*, 3 in. off 3 in. up to 24 in. and 4 in. off 4 in. up to 24 in., and so on in larger sizes. In view of the Government's intention to adopt every precaution against air raids, these tees, incorporating a flat valve which can be operated with one lever action, are specially suitable for isolating factories, blocks of flats, &c.

Gas Poker Publicity.

It was mentioned, with reference to the gas poker, in the course of a leading article last week, that a great many people do not yet know that such an appliance exists. The responsibility for such a state of affairs can by no means be put upon the appliance makers as is evidenced by the steps being taken by William Edgar & Son, Ltd., to popularize the gas poker by means of special publicity efforts.

In addition to supplying stick-on slips for attachment to correspondence, &c., these portraying a colourful Mr. Therm waving a lighted gas poker, the firm are providing cut-outs and other component parts for attractive window displays on the lines of the accompanying illustration. Incidentally, such a display also draws attention to the ease and convenience of gas plug and socket connections. Counter showcards on the same lines of the Mr. Therm figure in the window display are also available.

It is, perhaps, not universally appreciated what a good load the gas poker provides. It is one which might well receive greater attention from the sales side, and supporting publicity matter such as we have referred to above should greatly assist salesmen who are working on gas poker campaigns.

Shanghai Under Fire

by J. K. SIMPSON, B.Sc.

Hostilities Endanger the Gas-Works

This vivid account by an eye-witness amplifies the report which we published on Nov. 17 of the repercussions of the recent hostilities on the Shanghai Gas-Works. Like his Chief, Mr. W. J. Baker, from whom came the previous story, Mr. J. K. Simpson (the Deputy-Engineer) was more than an eye-witness. He describes many incidents in the closing down and re-opening of the Works, including the exploits of the gallant band who faced other risks than bullets and shell-fire in re-establishing the gas supply—the few available members of the British technical staff who returned with a handful of scared coolies.

Chapei on fire. On the left, separated from the Gasholder Station by the Soochow Creek, is the building in which the Chinese "Doomed Battalion" fought.

Saturday, Aug. 14, the day of the first air raid, dawned sunny and bright. The Settlement trams and 'buses were running as usual, policemen on point duty, and road repair gangs at work, and everything apparently quite normal except for some machine gun and rifle fire away beyond the Settlement boundary. The local tension between the Chinese and Japanese was a direct result of the killing of two Japanese military men in the extra-settlement roads. This, following the alleged aggressive movements of the Japanese troops in the north, had made the general situation tense, but it was confidently expected that the matter would be settled diplomatically, at least as far as Shanghai was concerned.

The concentration of Chinese troops about Shanghai had alarmed the Chinese living beyond the Settlement limits. Most of our employees had left their homes and were living with their families in a bamboo matshed which had been erected for the purpose inside the Works compound.

At about 9.30 a.m. the first squadron of Chinese planes passed directly overhead and released a hail of bombs just north of the Works. The explosion of the bombs was followed by a terrific burst of machine-gun bullets and anti-aircraft shells from the Japanese ground forces, who were evidently well prepared. Chinese civilians in Yangtszepoo Road, who had been walking about unconcernedly scattered in all directions terror stricken. After this matters rapidly became lively. The planes circled back, the machine-guns and anti-aircraft guns opened up again, and more bombs were dropped. The aeroplanes, flying high, appeared to be large tri-motored monoplanes.

Instructions were given to run up English flags to the top of all buildings and structures, and the coolies grasped the idea and had our Coronation flags fluttering at all points very speedily.

Shortly afterwards the planes returned, and one bomb dropped to the east of the Works on a coal dump, raising a vast cloud of coal dust and hitting too coolies. Another dropped close to a British factory just west of us.

Representations were being made in the meantime to the Chinese authorities to prevent the apparent indiscriminate bombing of the Settlement properties. We also endeavoured to obtain an armed guard of naval men or volunteers, but were unsuccessful.

In the meantime, bombs had been dropped in the Central District and in the French Concession, causing an appalling loss of life—one bomb alone killing and wounding a thousand persons.

At about 5 p.m. there was a very severe air raid by six aeroplanes. Anti-aircraft shells were bursting all around; a bomb was dropped on a British oil company's works due west of the Gas-Works on the other side of the river, and they went up in flames and huge clouds of smoke. A Japanese fighter came to intercept the bombers, which separated and wheeled into the clouds. Then a Chinese fighter tackled the Jap, and these twisted and turned and wheeled with their engines roaring. The bombers wheeled together again, passing directly over the Works. Two bombs were unloaded while the planes were directly overhead as we saw a police patrol in Yangtszepoo Road opposite our office dive behind a house for safety. There was a terrific explosion and a violent blast of air, the bomb landing about 100 ft. away. The objective of the Chinese planes appeared to be the Dah Kong Cotton Spinning Mill, a Japanese factory adjoining our Works.

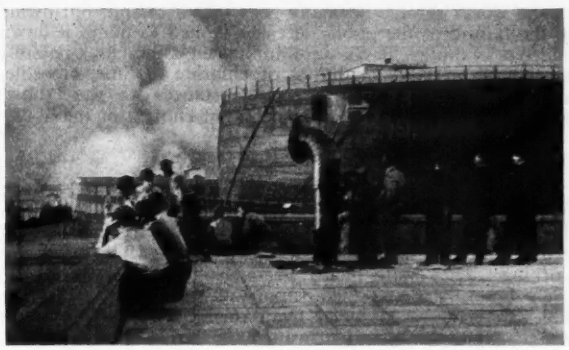
Shutting Down the Waste-Heat Boiler.

In the Works we found that most of the Chinese employees and their families were in the tunnel beneath the coal store. More bombs dropped in the river just east of the Works, apparently aimed at Japanese gunboats and river boats. It was then decided to shut down the waste-heat boiler owing to the danger of a serious explosion if it were hit and the possibility of the water level getting too low if it

The final blaze of a portion of the building in which the "Doomed Battalion" fought. The proximity of this building to the Gasholder Station can be seen from the photograph in the heading of this article.

were left unattended. Later the plant was shut down, extractor engines stopped, producer steam valves closed and retort steam shut off, and the exhauster stopped, the gas blowing off at the Peebles governor as the foul main blow-off had jammed shut.

That night the entire Yangtszepoo district blacked out in anticipation of a night air raid. The oil company's tanks were burning fiercely, and our plant was illuminated from end to end. All our buildings are of reinforced concrete, and were clearly visible. The aluminium-painted retort house chimney stood out brilliantly, and we felt that our chances in the event of a raid materializing were not good. There were occasional bursts of gunfire along the Settlement boundary and green and red signal lights going up somewhere in Chapei.



The Gas Company Staff and U.S. Marines watching the Chapei fires from the roof of the Company's Workshops.

Conditions on the plant were good, retort heats were excellent, all dampers had been put to scurfing positions, the chimney pull was 30 tenths. The waste-heat boiler had been generating some steam and the water level was low. There was some difficulty in starting the pump owing to the steam line being waterlogged, and before we got it to work the low water alarm blew. It gives a very piercing whistle, nerve-racking even during normal times, and was a fitting climax to a difficult day. The boiler air slides were opened up to assist in cooling it down.

Sunday morning, Aug. 15, was stormy, a blustering north wind and driving rain looked like an approaching typhoon. Coolies were started trimming the coal level in the godown so as to afford a maximum of protection. A barricade of bags and baskets filled with oxide was also built up at the entrance to the coal godown tunnel. Another squad went over all the flags and lashings and tightened them up in view of the rising wind. The gas delivery for Saturday was 1,500,000 cu.ft. (63% of the previous Saturday's delivery). The gas stock was two million, which it was estimated would last till Monday morning. To maintain supply the plant would have to start up before 6 p.m. Sunday night, and the minimum stock would then be 1,000,000 cu.ft.

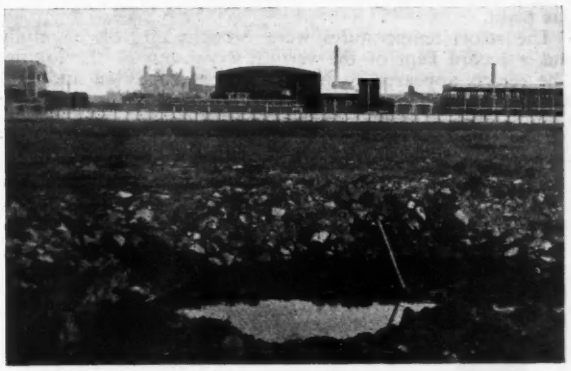
A British policeman from the Yangtszepoo station informed us that the Chinese were victorious everywhere and were pushing towards the Settlement in overwhelming numbers, that the small Japanese naval detachment had no reserves and were unlikely to get any in view of the approaching typhoon, and were being driven back rapidly. They had made arrangements to evacuate their station about ¼ mile north of our Works, and expected to leave any time. Unfortunately they could not promise to pick us up when they evacuated. They had already transferred all the women and children, both foreign and Chinese, to the central district. Air raids started at 9 a.m. and continued throughout the day, bombs dropping close by in the river and in the Dah Kong factory, and pieces of bombs were dropping inside our compound. The Chinese employees were getting badly scared by this time, and some of their women had commenced to scream at the approach of the planes. They approached us in a body, stating that they wanted to leave the plant and be taken to the central district, and at 4 p.m. it was decided to evacuate the plant after further urgent representations to secure a naval or military guard had failed.

The Works Evacuated.

Producers were filled up, and it was noted that the consumption was 30% of the normal. Heats were excellent. Waste-heat boiler pressure was well down and slowly falling. The gasholders had been emptied to within 1-1½ plates of grounding, so that the top lifts would not ground during the night or during cold weather. Fires were drawn from the Lancashire boilers. We then went round the plant, making ready to lock up all the buildings. The Chinese at this time seemed to feel that we might leave without them and followed us everywhere. They were assured that we would only leave after they had first been taken away, but they still remained suspicious. At 6 o'clock we were informed that a launch carrying a naval guard was on its way. The coolies were told to assemble at the bund. We packed our grips and sent them down and then systematically covered the plant, tripping the power switch and seeing that everything was secured and collecting all keys.

It was a wretched night, dark, cold, and raining. After some manœuvring the launch came alongside. It was a roomy ship's tender and took the entire 320 Chinese men, women, and children, and us three foreigners easily. The British naval detachment did sterling work in getting the Chinese aboard in an orderly manner and preventing a wild scramble. At 9.30 a.m. we were disembarked at the Nanking Road Jetty.

During the next week or so the situation in Shanghai improved somewhat with the arrival of large bodies of English, French, and American troops. The Japanese had landed very large reinforcements and seemed to have gained command of the air. Chinese planes were now confining themselves to regular night raids. Nine days after we had abandoned the plant and after carefully notifying the Japanese Naval Authorities of our intentions, we re-visited it for a general examination. There was some possibility that we might be sniped at by Japanese patrols in the Dah Kong factory, and we made a particular point of notifying them of the exact time of our visit. We also decided that three men were necessary for the visit, since one would have to remain on the launch to see that the Chinese laodah (pilot) did not take alarm and leave us stranded.



The Company's Yangtszepoo Works with bomb crater in the foreground.

On landing we found everything in good order and undamaged, although Chinese property opposite the Works had been smashed to smithereens, and a small steamboat in the river had been damaged and beached alongside our bunding. Two explosive bullets had landed without exploding in the yard. Outside the Works entrance there were large numbers of empty rifle cartridges, which seemed to confirm rumours the Chinese had at one time broken well into the Settlement in the vicinity of the Works. It was rumoured that they were afterwards driven off by shell fire from the warships. The retort combustion chambers were black, the producers were hot, and the producer common CO flue glowing, due to the fuel getting below the curtain arch. Generally the prospects of starting up again were not too good. On the one hand it was extremely urgent to open up the supply to our consumers with the least possible delay; on the other hand,

there was still a serious possibility that the plant might be damaged by the Chinese batteries established in Pootung. Further, there was the danger of Chinese snipers entering the plant, and this actually happened in one British company, the snipers being followed up by Japanese, who threw hand grenades and did much damage. Thirdly, it was still impossible to obtain a guard.

The retorts were well below the critical temperature 575° C., so that the major damage to the setting was already done, and it would not be desirable to light up if there was any danger of having to drop the retorts again. Moreover, the transfer of gas from Yangtszepoo to the central district depended absolutely on the 14 in. high-pressure main being undamaged, and according to reports a portion of this main was still within the Chinese lines. Finally, the entire situation might be changed at any time if the Chinese succeeded in obtaining ascendency in the air.

Re-Starting the Plant.

It was, however, decided to start gas making as soon as possible, and by "pulling wires" among influential Japanese friends we arranged that eighteen foreigners and sixteen Chinese should be allowed to go to the plant on Saturday, Aug. 28, and live on the premises. Arrangements were also made to move coke in trucks from the Coke Contractor's yard in Ningkuo Road about ¼ mile away. It was estimated that about 1,000 tons would be required to "raise" heats and to operate the water gas plant.

The journey to the Works was uneventful under the escort of Japanese police. The men we took down had been very carefully selected with a view to the work to be done. This had been carefully planned and allocated, and everything went forward very smoothly. The producer grates in the retort house were still covered; they were lightly charged and pricked up. The retort waste gas flue temperatures were above 300° C. Chimney pull 0·12 in. water gauge.

During the next few nights we had some bad air raids, which rather alarmed the Chinese. There was also the possibility that the lorries transporting coke might be stopped by the Japanese, who were moving very large quantities of supplies and troops along the road. Consequently, it was not until Sept. 5, when we had built up a sufficiently large coke stock, that it was considered safe to start up the water gas plant.

The retort temperatures were brought up very carefully and a record kept of the vertical expansion of the setting. The retorts appeared to be in excellent condition and very little, if at all, damaged by the shut-down. This has since been confirmed by the excellent gas makes per ton obtained. On Sept. 8 eight retorts were charged, and on the same day the gas was opened to the district, the district mains being carefully purged. The entire operation was very carefully carried out, particularly in view of the danger of accidental leakage, since we were distributing 100% water gas. The coal gas output was gradually increased, and by Sept. 11 the water gas plant was no longer required, and was finally shut down.

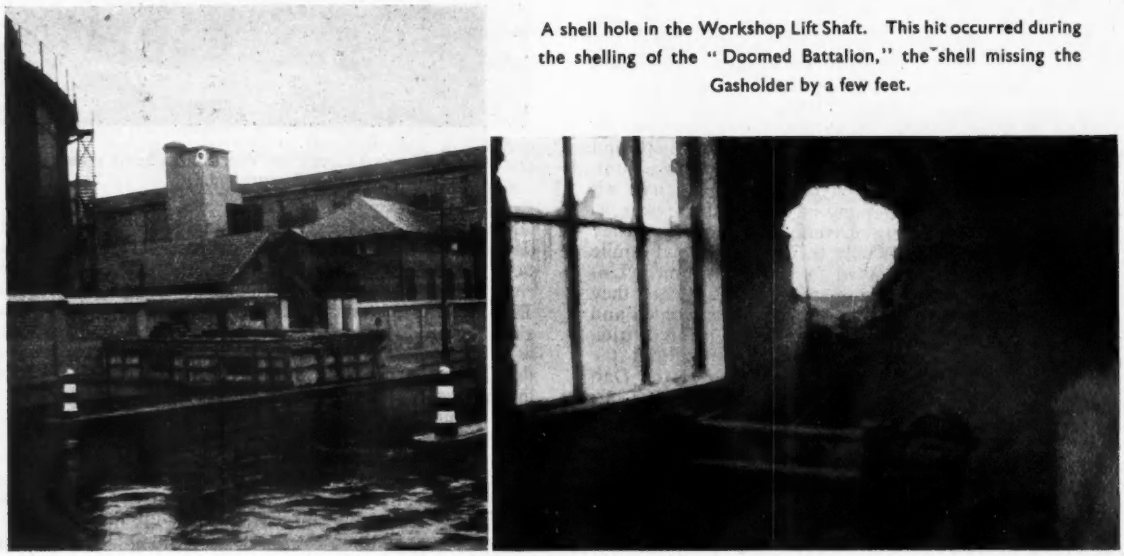
Owing to the isolation of the Yangtszepoo district we were all sleeping in the office buildings on camp beds. The weather was hot and the place was swarming with mosquitoes and flies at first, which made things most uncomfortable. Food was difficult to get through, owing to restrictions on transport imposed by the Japanese military authorities, and under the circumstances was served in a very rough and ready manner at meal times. Finally, we managed to get conditions fairly comfortable. When, however, a small unit of the Shanghai Public Health Department began to cremate corpses at our doorstep a very violent protest was made, and after the second time they moved off in a hurry.

The works sewage normally goes into a cesspit, but owing to the failure of the public services we had to pump it down our Works drains. Risks were minimized as much as possible by the use of large quantities of chloride of lime, creosote, and plenty of water. In the circumstances we were, however, fortunate to escape an epidemic of cholera or the like.

Trouble with the Coolies.

On Sept. 7 we had some trouble with the coolies. Some stated that they were afraid and wanted to be taken back to the central district, and the men on the coke transport stated that bullets were whistling over their heads while they were working. They were finally persuaded that they were relatively quite safe, and their supply of rice, meat, and vegetables were increased, which made them quite happy. It was also arranged that the night watchman should warn the retort house stokers and water gas operators in case any planes approached to give them ample time to leave everything in order and take shelter in the coal godown tunnel.

After this things went on fairly uneventfully until Oct. 27. On this day the Chinese troops retired from Chapei after setting the area very completely on fire. On Oct. 28 the Japanese flag was flying at all points in the almost completely gutted area, with one exception. This was a large bank godown situated directly opposite the Company's head office, workshops, and gasholder in Yu Ya Ching Road, in which the Chinese had left 400 men. From Oct. 28 to 30 a miniature, but exceedingly fierce, battle was waged around the godown with hand grenades, machine guns, and trench mortars in action. On Oct. 30, at midnight and after giving due warning to the Settlement authorities, the Japanese brought howitzers into action. Several shells missed the godown completely although the range must have been almost point blank, and passed over the Works and landed in various buildings, including a Japanese bank on the bund a good ¼ mile away. At 1.30 a.m. on Oct. 31 a shell missed our



A shell hole in the Workshop Lift Shaft. This hit occurred during the shelling of the "Doomed Battalion," the shell missing the Gasholder by a few feet.

holders by feet only and exploded against the workshops lift shaft, blowing a hole 3 ft. diameter and damaging the hoisting machinery. Machine gun bullets were whistling down Yu Ya Ching Road. The governor house was evacuated and holder and governor valves closed, and for a period of about 30 minutes the district was supplied direct through the high-pressure main, the pressure being reduced to 6 in. water gauge to prevent pressure building up in the low-pressure mains. The shell fire continued for half-an-hour more, and then the Chinese forces received orders from Nanking to evacuate into the Settlement. The Japanese took possession of the building and the danger was temporarily over.

Since then the war zone has moved westward, and with the landing of Japanese troops at Chapoo there appears to be a definite prospect of the early retirement of Chinese troops from the Settlement boundaries, and possibly some prospect of the termination of the struggle in the near future.

As regards present conditions in Shanghai, industry is temporarily at a standstill, and with large numbers of the foreign residents evacuated to Manila, Hongkong, and elsewhere, and the northern and eastern districts largely gutted and demolished, our daily gas delivery is only 40% of the corresponding delivery in 1936.

Financially the situation is serious indeed, affecting all business, private and municipal. On the one hand the Settlement authorities are faced with the expense of housing, feeding, and caring for the health of several hundred thousands of destitute Chinese refugees, the cost of the Settlement defences, and in the future the cost of repairing damage done in the Northern and Eastern districts involved in the hostilities. On the other hand, they are faced with a greatly diminished revenue owing to the isolation of the above districts and the general condition of business.

However, it still remains to be seen whether the hostilities will have a permanently bad effect on Shanghai's welfare and foreign population. Should an external demilitarized zone be established round the Settlement areas there would appear to be a distinctly brighter future ahead.

I Was a Gas Canvasser - - - - -

A Journalist Puts the Spotlight on House to House Selling

It began at a business luncheon. I sat next a smart young man who told me that he was branch manager of a sales firm conducting a house-to-house canvass for gas companies. I looked sympathetic.

"Canvassing," I said, with a recollection of innumerable persistent callers at my own door, "must be the world's worst job."

He was surprised. "Where did you get that idea? It is all a question of picking the right men, putting them on the right path, making them work to a proper plan and treating them decently. Look at my own crew. They are not dissatisfied; most of them have been with me a year or more. They get 10% in commission, and one young fellow whose only previous experience of selling was to weigh out ounces of shag in a tobacconist"s shop is averaging £80 in sales a week. If sales slack off we give them advances to even things out. If our boys strike a bad patch or knock up against crusty customers they just 'phone the office and either myself or my assistant will go out with them to lend a hand and put them in good heart again."

In short, he spoke as you would expect a sales manager to speak, and wound up by suggesting that I should do a few days' canvassing. It is a tribute to his persuasive powers that I accepted the challenge.

So one dank, wet Monday morning, with a streaming umbrella and sodden coat, I presented myself at his office in a noisy High Street that might have been found in any industrial town. Lighted trams clanged and thundered outside. Everything was depressing until I saw the cheerful and undaunted demeanour of my sponsor and his assistant.

They at once began to initiate me into the mysteries of my new calling. First of all came the "call-sheet." This is the list with addresses of 24 consumers who must be called on during the day, letters of advice having been sent in advance by the gas company. A space for the individual report is left opposite each name. Then I was shown how to fill in the various forms of sale which must be countersigned by the consumer's husband when the first payment is made (in this company the first payment must be paid before any appliance is installed). Then I was taken down to the gas company and introduced to the sales manager, who gave me a short lecture on the company's policy and warned me against high-pressure methods of selling.

"Every customer," he said, "is an individual whose tastes and needs must be studied."

I was then given a binder containing illustrated leaflets of the company's appliances and was told to study it in preparation for my first calls next day. I found that I had to report each morning to the district inspector at the local office. The attitude of the gas officials towards the canvassers was helpful and friendly, even cordial. I scurried off through the rain to study my book of words, glad of a few hours' respite before my ordeal. I should add here that the ordinary canvasser receives a regular course of instruction both at the gas offices and from the manager.

At 10 a.m. next morning, "call sheet" in hand, I stood at the beginning of a long grey street of small houses, relieved only by a fried fish shop and a scrap metal yard. The assistant manager, an irrepressibly cheerful man with many years' experience of the Gas Industry, had come to help me on my first calls. Together we made about half-a-dozen calls, with my companion doing the talking and myself playing gooseberry. Long experience had made the assistant manager a shrewd judge of human nature. One housewife we spoke to seemed to have made up her mind to get a new cooker, and it was arranged that I should call again in the evening to see her husband; but as we came away the manager muttered, "Don't be too hopeful there; she's too glib."

Next door, on the other hand, we had some difficulty in gaining an entrance. The woman was shy and reluctant and certain that she could not afford and did not want any new appliances. It transpired, however, that her husband was re-decorating the house, and in the course of conversation we found that she might possibly consider buying a wash-boiler. Here again I arranged to call in the evening on what seemed a slender chance of making a sale.

After the sixth house I felt able to go ahead on my own, and by a little after 1 o'clock I had completed my list of 24 calls. It was shortly before Christmas, and many housewives were not at home; indeed, a cobbler on my route informed me that at this time of year the citizens went far afield for their shopping and either had not enough money for boot mending or spent it in the wealthier districts. Thus, when I had got to the end of the street I had to retrace my steps to pay a second or third call on those who had not replied to my previous knocks.

A Mixed Bag.

They were certainly a mixed bag. Some were old age pensioners, others were on "relief"; many of the husbands were in the building trade and working short time because of the bad weather. Conditions varied greatly. Some houses

were as neat as new pins, while one in particular (belonging to an itinerant greengrocer) offended the olfactory sense to such a degree that the neighbours had invoked the sanitary inspector who, when I arrived, was examining a quantity of decaying green stuff in a zinc bath in the garden. It was impossible (as always) to judge income by appearances. One of my calls was on a woman who had 12 children all at work, and whose family income in the aggregate must have been large.

In all the houses my reception was good, even though this was the Tuesday after a wet Monday and washing was everywhere in full swing. A little brusqueness would have been understandable, but everyone seemed to be hospitable and to have a good work for the gas company. This was all the more encouraging because there had been a thorough canvass of the same district only eight months before. The gas company's formal letter of introduction which had preceded my visit was very useful in paving the way. I found plenty of evidence that these customers really appreciated a personally addressed letter.

Having finished my calls I found that I had three prospects for a second call in the evening, when the husbands would be at home. The afternoon was free. This is the case with most canvassers. No wonder they drop into the picture house. Next time you see a canvasser going into a cinema, reflect that he has probably done a hard morning's work and will have to set to again in the evening.

I called on my first prospect at 8 p.m. She was the glib lady who had wanted a cooker. I found her in the throes of an argument with her husband, and she implored me to depart immediately, as I was in imminent danger of personal violence. If it did nothing else, this experience taught me the wisdom of the company's policy in requiring the first payment down, and the husband's signature to every hire-purchase agreement. Where no such provisions are in force there is a danger of the canvasser persuading the housewife to sign an order which she may not be able to afford and which the husband may not honour. Where the customer is not obliged to make the first quarterly payment down, the gas undertaking must be prepared for the return of a certain proportion of badly sold appliances when the first period of sale expires.

Snags in Selling Wash-Boilers.

My next call was on the woman who in the morning had seemed a faint prospect for a wash-boiler sale. As all salesmen know, there are two big snags in selling wash-boilers. One is the fact that landlords are sometimes unwilling to allow the dismantling of the solid fuel, built-in copper. Another is that many people use all sorts of rubbish for firing coal coppers. I was fortunate in finding a house-proud and progressive couple. The husband was a polished craftsman and had the house beautifully decorated. Even the coal copper was white-tiled on top and enamelled all round in green paint. Nevertheless, he was anxious to save his wife work, and after a great deal of talk, during which my spirits gradually rose, I had the triumph of seeing him sign the order. His pen hovered over the dotted line—little did he know that if he had changed his mind at the last moment I would cheerfully have murdered him!

At my third port of call, the returned husband was an electrician by trade, a very friendly and open-minded man. The couple had been down on the list for a new Council house, and since my visit that morning they had received notification that a house would be vacant early in the New Year. The prospect of an immediate sale faded, but they were anxious to have an enamel cooker and sink heater (" like mother has ") in the new house, and I perforce had to come away with their promise, to be followed up later by another salesman. I may mention here that in my subsequent calls in another street the door was once opened to me by this very electrician who was on a job in the same house, and who directed me to the kitchen in a helpful way, as though he had assumed a personal interest in my success. In fact, most householders seemed to be sympathetically impressed with the rigours of a canvasser's life. At one house where I called the husband, a railway platelayer, was sitting at tea in his shirt sleeves. He pressed a piece of cake upon me.

" Well," he said philosophically, " we are all apt to complain of our jobs now and again, but after all I should be thankful that I haven't a job like yours." But I forgave him for his patronage when he signed the order for a fire and for an additional lighting point in a back bedroom.

In all I had three days of canvassing, making 72 calls. The second and third days were much like the first—making calls in the daytime and keeping appointments in the evening. It may be interesting to set down some general impressions from my experience, bearing in mind that the company in whose district I was working has built up excellent relations with its consumers.

General Impressions.

Gas cooking was practically universal—though in at least 50% of the cases it was combined with the use of a coal range. A very high proportion of the consumers (all of them slot consumers) had new enamel cookers, which were kept in very good order. I came across one case of a woman with an electric cooker. She was fairly satisfied with it, but admitted that she would not have bought it if a gas canvasser had turned up first. This case, which of course I reported, will be followed up by a special canvasser, and no doubt a gas cooker will be installed at a future date.

Comparatively few of the households had any hot water system at all, and very few had baths; thus in most cases when a water heater was sold its use represented in the main a transfer of consumption from the cooker hotplate, though it is a matter of experience that the availability of hot water leads in a short time to a greater use of it.

Most of the houses visited had gas lighting. In a number of cases this was not in good order, and the company, which is anxious to keep the lighting load, was glad to know of these cases, and to have the opportunity of putting them to rights.

Several women asked if they could not have an all-in rate for gas—so pervasive is the influence of the electric tariff. On the other hand, it was noticeable in selling appliances that few customers bothered to ask about the probable running cost. This puts some responsibility on the salesmen in selling the right type of appliance for the customer's needs.

This company has several good and attractive showrooms and very efficient demonstrators, yet few of the customers seemed to have visited the showrooms or attended the demonstrations. It is fair to add that many of them had visited a large exhibition in the neighbourhood and said that they had been much impressed by the gas exhibit there. I have sometimes heard it said that the use of canvassers merely spreads the incidence of orders and robs the showrooms of business. This is certainly not true in the case of the company I worked for. Showroom business has kept at the same steady level as prevailed before the scheme of canvass was launched, and the showroom staff are on the best possible terms with the canvassers. The business done by the canvassers represents a large positive increase in total sales.

Summing up on the question of canvassers, I am surprised at the hesitation of some large undertakings in adopting this form of sales pressure. Even during my short experience I picked up the trail of electrical canvassers in many houses. It has sometimes been objected that canvassers use high-pressure methods which are against the true interests of both the consumer and the gas undertaking, and I myself used to share this suspicion. With proper safeguards, however, there is no danger of over-selling. These safeguards are, first, the rule that the first quarterly instalment must be paid before the appliance is delivered; secondly, that the husband's (registered consumer's) signature must be obtained so that there is no *arrière pensée;* and thirdly, that the canvassers must be carefully chosen, must be well directed and supported to the hilt by the gas undertaking, and that they must be made to feel that they have taken on a permanent job which is worth doing well.

When these limitations are observed, I am a whole-hearted supporter of canvassing for the Gas Industry. I found my colleagues keen, loyal, and enthusiastic. I do not envy them their job; but I admire their skill, their industry, and their success. Finally, if there is any gas manager who feels that he is getting out of touch with his consumers, let me recommend him to take the same course as I did and go out on the canvass.

Developments in Pipe Bending - - - - -

Since the adoption of the harder metals for pipes and tubing there has been a demand, not only in the Gas Industry but in the water, electrical, and engineering industries generally, for a simple and effective method of producing bends of a great variety of shapes and sizes in pipes of a wide range of sizes and material. The variety of conditions to be satisfied is still further increased by the fact that materials may be in a number of gauges of thickness according to the size of tube and also of different outside diameter for a given nominal bore.

by
S. F. DUNKLEY, O.B.E.,
and
R. N. LeFEVRE, M.Inst.Gas E.

Many ingenious inventions in the past have failed in application owing to a lack of appreciation on the part of the designer of the elementary fundamental principles involved. The difficulties involved in attempting to cover even part of such a wide range of conditions with one tool are considerable, particularly when it is realized that the largest demand and, to the Gas Industry, the essential requirement, is for a light, portable, and easily handled bending tool.

Effects of Metal and Use.

In the early days of the Gas Industry the metals from which small tubes were made were primarily lead, compo, and wrought iron. Later followed mild steel, copper, and brass;

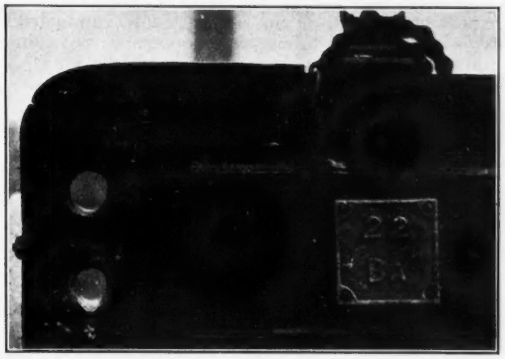


Fig. 1.—Close-up of Gasfitter's Hand Truck, showing Method of Attaching Bender to Side of Truck.

and then the more modern alloys such as cupro-nickel, nickel-chromium steel, &c.

A particular use demands a tube of suitable rigidity, bursting strength, machinability, workability, and having a reasonable length of life. This presumably is largely the cause of the present confusion and difficulties of universal classification as to size.

Tubes made from some metals are classified by their internal diameters and others by their external diameters, the latter varying with the gauge. This results in complications in an industry using more than one class of tube or tubes made from different metals; screwing, jointing, and bending requiring a multiplicity of dies, fittings, and bending tools. An added complication is the effect on the physical and mechanical properties of the tube due to impurities in the metal and the particular process by which fabrication is carried out.

"Bendability" of Tubes.

The bending of tube without a machine or special means of supporting the walls of the tube is a difficult operation unless the walls are sufficiently thick and strong to withstand the bending process without collapsing—and always providing the radius of the bend is not too small. But under these conditions the physical effort required is considerable unless adequate mechanical advantage is obtained.

The facility with which a pipe can be bent satisfactorily depends largely upon—

(*a*) the ductility (cold flow) of the metal,
(*b*) the gauge or thickness of the walls of the tube,
(*c*) the diameter of the tube, and
(*d*) the radius of the bend to be produced.

A perfect bend should be—
(*a*) perfectly round, with no signs of flattening or restricting;
(*b*) free from buckling on the inside or sides, and
(*c*) of equal cross-section throughout.

In order to satisfy these requirements and produce the perfect bend it is imperative that the tube, while being bent, be supported over its entire circumference and that the action of bending be such as to cause the metal to flow equally on the inside and outside of the bend. In practice, however, this is impossible even under the best conditions, and actually the bend is 6% thinner on the outside than the inside. To start and continue this flow of metal obviously requires considerable force, which is largely proportional to the amount of metal to be moved. That this force is a heavy one can be judged from the following table:

Mild Steel Tubing.

Nominal Bore.	B.S.I. Gauge.	Radius of Bend.	Hardness (Brinell).	Average Bending Force, Point of Contact.
⅜ in.	Steam	2½ in.	132	1,570 lb.
½ ,,	Weight	2⅝ ,,	131	2,460 ,,
¾ ,,		3½ ,,	114	5,925 ,,

Copper Tubing.

Nominal Bore.	B.S.I. Gauge.	Radius of Bend.	Hardness (Brinell).	Average Bending Force, Point of Contact.
⅜ in.	18	2 in.	50	380 lb.
½ ,,	18	2⅛ ,,	70	1,185 ,,
¾ ,,	18	3½ ,,	49	1,190 ,,

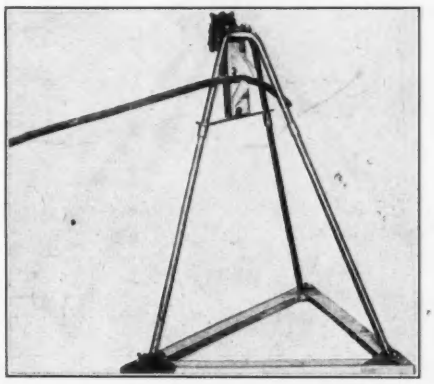


Fig. 2.—Light Portable Pipe Vice with Tube-Bending Attachment. The latter is shown in use.

Scope in Design.

This comparatively heavy force demands in the pipe bender not only sufficient strength to resist it, but also a good margin to cope with contingencies which may arise from a number of causes.

Strength usually suggests weight, but if cost is not of major

importance advantage can be taken of light gauge alloy steel or forged aluminium alloys such as duralumin.

In designing a pipe bender there are three well-defined conditions of use in the Gas Industry for which it is necessary to cater. These are:

(i) *Use in the Workshop.*

This presents to-day little difficulty, as weight and port-

Fig. 3.—Detail of Bending Eye. The Socket, A, is screwed to take the Handle, B, of the Die-stock.

ability are not of particular importance and gearing or power are available and can be applied if necessary.

(ii) *Use in situ on large and lengthy installation work.*

In this case materials and tools are usually delivered by transport to the job, and although weight and lack of portability can be a hindrance in the matter of transport and movement from one part of the building to another, labour is usually available, and the greater stability, ease of operation, and quality of work by far outweigh any disadvantage from this point of view.

Fig. 4.—The No. 2 Hilmor, suitable for Copper Tubes up to 1 in. Diameter.

When carcassing a large building or a housing estate it is customary for a fitting shed to be made available, and thus, apart from power, conditions are frequently comparable with those in the workshop.

(iii) *Use by the fitter on small installation and repair jobs.*

This is the most difficult condition to cater for, as often materials and tools have to be carried from job to job and lightness and portability are of paramount importance. Even if the most modern system of motor transport delivery is available, the question of capital outlay, on the large number of expensive tools that must necessarily be in circulation at one time, must be considered.

Available Benders.

During the last 30 years several types of pipe bender have been placed on the market. Many have failed to become popular due to a deficiency in one or more of the directions mentioned above, and thus we are left to-day chiefly with the original and older types of heavy bench bender, together with a number of heavy portable benders of ingenious but complicated design, but obviously originally intended for the bending of tubing used for general engineering purposes in the workshop and not designed specifically for the domestic pipe fitter.

Bending of Steel Tubing.

Bending on Trucks.

Some ten years ago, before the introduction of motor transport, when all the gear required by the fitter was carried by hand-truck, a successful effort was made to assist the installation fitter by fitting on the district truck a pair of small specially shaped aluminium eyelets. The general arrangement of these eyelets is shown in fig. 1.

The eyelets, together with their mounting, made an addition in weight to the truck of only 2 or 3 lb., and while this assembly may not have produced quite a perfect job, the device was cheap, convenient, and certainly eliminated difficulties as far as steel tubing was concerned, providing the fitter, as used to happen, had his truck on the job.

Bending with Portable Tripod and Vice.

With the advent of the single-handed fitter came the need for a light portable tripod and vice. This was met by the

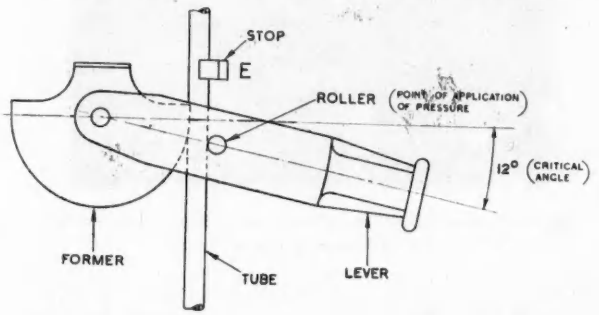


Fig. 5.—Diagram Illustrating Critical Angle of Leverage when Bending Tubing.

development of a light collapsible tripod and vice for use with tubing in sizes up to ½ in., the total weighing only 7½ lb.

The rapid extension of the system of delivering tools and materials by motor transport, coupled with the mobility and increased use of the cyclist-fitter, created a greater demand for a heavier portable tripod and vice for use with tubing up to 1 in. in size. In these circumstances the fitters have to carry out larger installation jobs and work with steel tubing of the larger sizes. These vices, together with the tools, are generally carried to the jobs by a fitter and his mate, or conveyed to a central spot by means of a truck or transport.

Subsequently a pipe bender in aluminium alloy was developed and attached to the heavier tripod. This has since been reduced in weight, and now weighs 21 lb., which is the minimum weight possible in view of the fact that the tool is used also for cutting, screwing, and assembling. The tripod vice with the pipe bending attachment is shown in fig. 2.

These two tripods, particularly the heavier one with pipe bender, have become very popular, and there are many hundreds in use to-day.

Owing to the heavy strain in bending the larger-size steel tubing on these tripod-vices (and the fact that the municipal authorities made their drain grids smaller to prevent their use for this purpose!) there has been developed in addition,

and placed on the market, a bending eye weighing 2¼ lb. for transport in the fitter's tool bag. This tool is suitable for bending up to ¾ in. steel tubing. In order to reduce weight, the bar support is obtained from the handle of the stock and die to suit which it has been screwed at the socket, as shown in fig. 3.

Bending of Copper Tubing.

Unfortunately, the pipe benders mentioned above are not suitable for brass, copper, or other light gauge tubing owing to the thinness of the wall of the tube.

The increasing use of copper tubing revealed the need for a tube bender suitable for such thin walled tube. Among the merits claimed for copper are its neat appearance and ease of bending, but if full advantage is to be taken of these qualities it is essential that a suitable tool be available and, at the time of the rise in popularity of copper tubing, no satisfactory portable bending tool was available for light gauge tubing. The result was that fitters were attempting to bend the tubing without the aid of a former of any kind, and the poor appearance of the flattened tubes caused many engineers to regard copper tubing with doubt and hesitation.

Co-operation with the Hilmor Company led to the production of the excellent range of light, portable bending tools, one of which is shown in fig. 4.

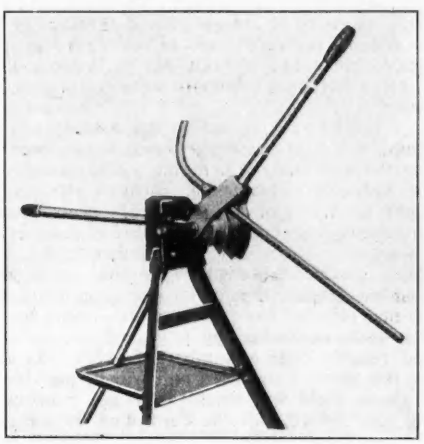


Fig. 6.—The "Scosam" Bender in Use in a Pipe Vice.

The range of pipe sizes for which each type is suitable and its weight are:

Type.	Range.	Weight.
No. 0	¼ in.– ⅜ in.– ½ in.	5¾ lb.
No. 1	½ in.– ¾ in.	28 lb.
No. 2	½ in.– ¾ in.–1 in.	36 lb.
No. 3	¾ in.–1 in.–1¼ in.–1½ in.	140 lb.

The principal features of this type of bender are—

(*a*) the fundamental principles stated above have been observed, with the result that perfect bends of all descriptions can be produced, and

(*b*) it was found that, when dealing with any metal, in order to produce a perfect bend there was a definite point on the tube, and in relation to the bottom former, at which pressure must be progressively and continuously applied. This point is 12° in advance of the point where the tube touches the former while lying in a horizontal line (fig. 5). Adjustment has to be possible to meet different sizes of tube and radii of bend, but the force required for bending is also largely controlled by this position. This is an important essential in the making of a perfect and unmarked bend, and the principle has been embodied in all four sizes of this bender by:

(i) a fixed guide in the smallest type, and
(ii) a fixed roller and moving guide in the larger sizes.

On other types of bender a movable point is fitted that automatically finds the pressure point.

Another light-weight portable tool is the "Scosam" bender (fig. 6), which can be used alone on small tubes or clamped in a vice for larger work.

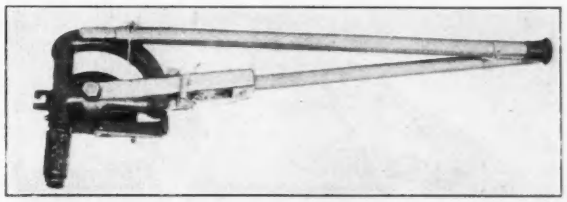


Fig. 7.—Latest Type of Hilmor Bender, shown Folded for Carriage.

Recent progress has resulted in the production of a bender embodying all the required principles which can be used either in a vice or, when this is not available, by applying the principle of foot supported floor-leverage. The latter is the suggested and more general method of applying force with this bender, but it can also be done when circumstances

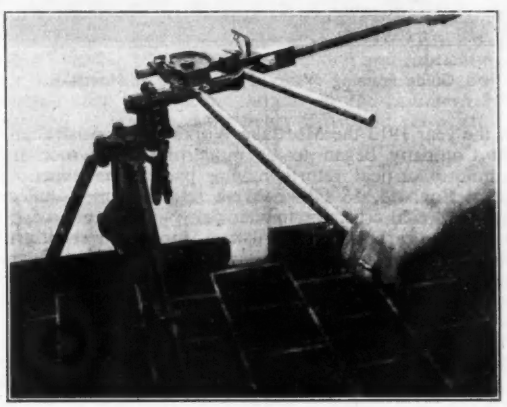


Fig. 8.—Horizontal Bending in a Vice.

permit, by means of inward pressure operated by both arms in a shearing fashion. The bender will operate ½ in. and ¾ in. tubing, which are the two most frequently used sizes, and its total weight in its present form is only 8½ lb.

The tool is shown closed for carrying in fig. 7 and one of its methods of usage is illustrated in fig. 8.

Modern Hospitals Use Gas

This is the title of a "Promotional Brochure" recently published by the National Gas Association of Australia. Its value lies in its undoubted capacity to interest all persons concerned with hospital construction or management in the potentialities of gas as a fuel for all purposes.

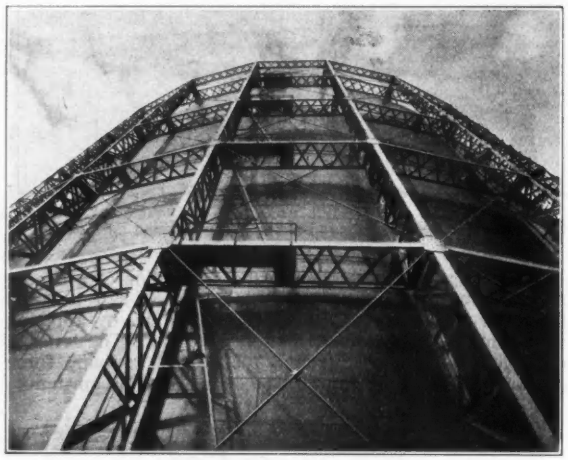
The brochure, which is profusely illustrated, is divided into five sections—namely, the kitchen, hot water supply, room heating and air conditioning, the hospital laundry, and sterilizers, stills, and other equipment, including incinerators and gas burners for clinical and other tests. Each section deals comprehensively with the various appliances available for the different purposes, and the photographs show not only examples of these appliances but also typical installations in famous hospitals throughout the world.

Electrical Year Book, 1938 Edition*

In addition to general revision in this edition of the "Electrical Year Book" particular attention has been given to certain aspects of power generation and distribution, two branches in which progress has gone substantially ahead. This new information is provided on phase sequence, symmetrical components, leakage protection, distance protection, and the protection of A.C. motors. The traction section has, as usual, been brought up to date, and there are some new particulars regarding certain kinds of meters.

*London: Emmott & Co., Ltd., 28, Bedford Street, Strand, W.C. 2. Price: 1s. 6d. net.

The Australian Gas Institute



Guide Framing of No. 4 Gasholder at Mortlake.

Presidential Address

OF

H. WOOD,

Engineer-in-Chief of the Australian Gas Light Company, Sydney.

(*Delivered on Nov.* 16, 1937.)

In the year 1913 the Mortlake Works of the Australian Gas Light Company began to be modernized and mechanized. Continuous vertical retorts having passed the experimental stage in England, 56 Glover-West retorts were installed, together with coal crushers, telpher conveying plant, and power house. The carbonizing plant was duplicated shortly after, is still in commission, and stands as a monument to the pioneers of the system. A few years later another vertical retort house was built, consisting of 160 larger capacity retorts producing 6 million cu.ft. of gas per day, and is still working satisfactorily.

Owing to the increasing demand for gas it was decided to erect a new retort house to be built in four quarters, each of 2½ million cu.ft. capacity, and to build the plant of Australian materials. Prior to this, all refractory materials had been imported. We could at that time obtain locally satisfactory fireclay materials, but not of sufficiently high quality for the retorts and combustion chambers. Silica materials were then considered, and those made by the Newbold Silica Company were finally selected. We were aware of the expansion of silica and the necessary provision was allowed for in the design. That the selection was justified was proved by the fact that the retorts worked continuously for nine years at a temperature between 1,350° C. and 1,400° C., with a maximum throughput of coal and without any major repairs. The producers lined with local firebricks also lasted nine years without re-lining. This Glover-West plant, having a capacity of 10 million cu.ft. of gas per day and producing over 90 therms of 580 B.Th.U. gas per ton of coal, is, I understand, the largest continuous retort house in the world under one roof.

The next big extension of the manufacturing section of the works was the installation of three 2½ million cu.ft. capacity Humphreys & Glasgow automatically operated carburetted water gas plants with self-clinkering generators, waste-heat boilers, together with relief holder, exhausters, condensers, electric tar precipitators, purifiers, and station meters. These plants were installed to take the place of manually operated C.W.G. plants, and were placed in commission towards the end of a coal shortage. Although the coke from the inferior coal obtainable contained an unusually high percentage of ash, which coke would have been almost unworkable in the manually operated plants, the generators worked without the slightest trouble. A fourth unit has since been installed.

The ash and clinker is mechanically extracted from the generators, drops on to a conveyor, and is deposited in elevated cast-iron storage hoppers, whence it is taken by rail trucks and dropped on to punts and taken to sea. Neither the coke to the plants nor the ash from the plants is touched by manual labour.

The plants are housed in an old horizontal retort house, and in this house it will be possible to install sufficient plants to produce 18 million cu.ft. of C.W.G. per day without any alteration to the building itself.

New Carbonizing Plant.

The latest major extension is a new continuous vertical retort house, together with auxiliary plant. Surprise has been expressed at our departure, with this installation, from the Glover-West to that of the Woodall-Duckham system. The Glover-West plants have always proved satisfactory and the change in systems is entirely due to our desire to try out a larger capacity retort, and it is felt that the Woodall-Duckham extractor, being horizontal, is more suitable for a retort with a long major axis.

Further, it must be acknowledged that each system has certain advantages and disadvantages, and it has been our endeavour in this new plant to combine the advantages of each system in order to obtain the most satisfactory plant. Twenty-eight 82-in. major axis upwardly heated retorts, 25 ft. high, are being installed. Each retort is designed to carbonize 8 tons of coal per day. A number of what we feel are improvements for carbonizing Australian coals have been embodied in the design. One major alteration is the provision of two vertical offtakes from each retort—owing to the long major axis—each controlled by a gas offtake valve, which has proved reliable over a number of years. By this provision it is felt that a more even pull will be possible and an improved therm yield will result. The gas from each bed, comprising four retorts, will be controlled by means of an "Askania" regulator further to ensure a constant minimum suction on the retorts. The provision of a governor to each bed is in the nature of an experiment, and provision has been made to fix a large single governor on the foul main to try out the efficiency of the single governor as compared with governors on each bed. It will be understood that, when working a number of governors, the single governor will be by-passed and, similarly, when the single governor is in operation, the individual governors will be left full open.

Future Carbonizing Plants.

The latest type of continuous vertical retorts has proved very successful, and when equipped with waste-heat boilers very high efficiencies are obtained. The discharging of practically cool coke and the ease of charging the retorts call for little improvement.

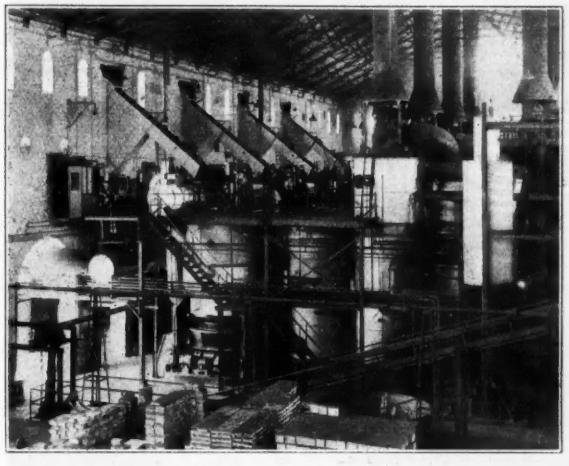
There is, however, the cleaning of the producer fires, which is definitely the most arduous part of the work. Following the introduction of mechanical extraction of clinker from the generators of the automatic C.W.G. plants, it is felt that, for large installations, provided a simple and satisfactory method could be provided for re-heating the producer gas after being washed, mechanical producers for heating vertical retorts are worthy of consideration in order to reduce labour costs.

A new retort plant has been designed with the provision for passing the washed producer gas around the bottom of the retorts for re-heating in place of the secondary air, and it is proposed to erect an experimental bed to determine whether it is possible to re-heat the producer gas to a sufficiently high temperature to enable the requisite temperatures in the combustion chambers to be obtained.

Should the experiment prove successful it would also be applicable to hand clinkered producers by washing the producer gas before being passed around the bottom portion of

the retorts. It is considered that by the elimination of the dust and other impurities more uniform heats will be obtained, and considerable economies may be possible by the use of clean producer gas in prolonging the life of the refractories.

With smaller installations of continuous vertical retorts or horizontal retorts a small automatically operated hand clinkered blue water gas plant erected alongside the producers is considered to be the most efficient method of reducing the coal gas to the required calorific value. The provision of a steaming chamber in a vertical retort, which necessitates the reduction of throughput of coal in order that the steam may be efficiently converted, is not considered economical. The aim should be to obtain the maximum throughput of coal per retort-day, and produce a high calorific gas. In place of the steaming chamber a further combustion chamber, together with an air circulating chamber, should be provided. The provision of an air circulating



Automatic C.W.G. Plants erected in the old Horizontal Retort House at Mortlake.

chamber, or a producer gas circulating chamber, for cooling the coke in the retort is essential when making a gas of a high calorific value.

Gasholders.

It has been the practice in the past to have gasholders designed and fabricated in England, or to purchase the steel sections and sheets from overseas and fabricate the holders in Australia. There has always been a difficulty in obtaining light gauge sheets of 9 to 11 gauge free from imperfections and perfectly flat, without having to resort to patent stretching. In an attempt to prolong the life of gasholders, sometimes sheets made of special steel, and in some cases puddled iron, have been used.

Following upon the decision to provide a 6 million cu.ft. holder at Mortlake, it was decided to design and fabricate the new holder in Sydney with Australian steel and erect it by our own staff. Before commencing, however, the designs of all the holders previously erected were carefully examined to determine any improvements that could be made to reduce costs of fabrication and erection, and of any portions subject to severe corrosion due to ledges and spaces where foreign matter and moisture could accumulate and corrode the steelwork. The preservation of the underside of the crown was also given attention. The joints of the crown sheets were designed to allow grease paint to be used for protection against corrosion.

In order to prolong the life of the holder it was decided to use plates not less than $\frac{3}{16}$ in. thick, all holes to be drilled and edges planed for caulking, and to caulk all seams inside and outside of the crown, inside of the side sheeting, and outside where considered necessary. No tape and no rivets less than $\frac{3}{8}$ in. diameter have been used on the work.

The design of the holder and method of erection are entirely new to Australia, permitting of all rivets being machine driven. The number of $\frac{3}{4}$ in. diameter rivets knocked down by hand on other holders was 300 per day per man, but by each machine on the new holder up to 2,000 per day were driven without any great effort on the part of the boilermaker. The crown plates of the new holder are 15% heavier and the side plates 24% heavier than the 12 million holder at Mortlake. The side plates are twice the length, which practically halves the number of joints.

The whole of the rivets used on the job, half a million in number, were also made in Australia from Broken Hill Propriety steel.

The quality of the Australian plates used in the work was excellent. The total rejects on the whole job were only 1·13%, compared with 12·3% and 6·83% of two consignments of gasholder plates previously imported from England.

It is estimated that the cost of a holder of similar design and construction, fabricated in England, including exchange, duty, and other charges, erected at Mortlake by our own staff, would have been

Less actual cost of concrete tank	£150,000 28,516
Cost of holder	£121,484
The actual cost of the holder erected was ..	£99,355
Less actual cost of concrete tank	28,516
Cost of holder	£70,839

showing a saving of £50,645 by designing and fabricating the holder in Australia. It is the largest holder yet built of Australian steel, the second largest in the Southern Hemisphere, and is considered the finest of its kind yet built.

Coke.

The position that coke should occupy in the Gas Industry has been a vexed question for many years, and one on which there is a sharp division of opinion. On the one hand it is claimed that the Industry should concentrate on gas and regard coke as a by-product, and, on the other, that coke should be promoted from its present position of sleeping partner to an active partnership in the business.

Many strong arguments can be adduced in favour of the two-fuel policy, a policy that has the support of most of the responsible overseas fuel technologists, who claim that gas and coke must always be complementary, and believe that by following that policy the Industry will find a vast unexplored market willing to absorb coke provided that the quality and price are acceptable.

In every instance in which gas is unable to obtain a potential, or retain an existing, customer on account of the cost, the Gas Industry should hold the field against all comers by taking advantage of its most valuable possession, the ability to supply either a solid, liquid, or gaseous fuel.

In Australia, some 80% of the population is in receipt of an income of less than £5 per week, and 78·5% of less than £4 per week. In consequence, it is not the wealthy section, the luxury market, that forms the main outlet for the products of the Gas Industry; the important factor is the amount that the majority of the population, those earning up to £4 5s. per week, can afford to spend on fuel.

It is well to sell a gas fire, but how can we expect people on the basic wage, or, for that matter, higher paid workers, to use a gas fire or an electric radiator continuously during the winter months? Suffice to say they do not, and where coke is not available they use wood and coal. The demand for slow combustion stoves is steadily growing, and coke has a potential market for this purpose and for hot water systems.

During my recent trip abroad I was much impressed with the attention being given by most gas companies to the preparation and marketing of coke, and the remarkable increase in sales that has taken place. In many works I found new retort plants or coke ovens being installed to take the place of existing plants, in order to produce coke suitable for their markets.

Upon my return to Sydney, steps were immediately taken to prepare designs for a suitable screening plant for our Blackwattle Bay Coke Depôt, to replace the existing one which was due for reconstruction. Much time and thought has been given to the design, and it is felt that when completed it will compare more than favourably with plants observed abroad. Coke cutters and vibrating screens are be-

THE PIONEERS OF THE MAIN PORTABLE GAS FIRE

draw your attention to the

GLOWMAIN

Flueless Gas Heater

(PATENT APPLIED FOR)

R. & A. MAIN LIMITED, LONDON AND FALKIRK

London Office and Showrooms : 48 Grosvenor Gardens, S.W.1. Glasgow Office and Showrooms : 82 Gordon Street

ing installed, and by means of a number of rubber belt shuttle conveyors a large storage of the various grades of coke is being provided to reduce to a minimum delay in supplying customers. This matter of delay must receive attention for we cannot expect lorries to wait for lengthy periods for their requirements, as such lost time is reflected in the value of the coke. De-breezing screens at the outlet of the hoppers are also being provided to enable dust-free coke to be sold.

As we are to-day suppliers of fuel, we should regard our progress not by sales of gas alone, but by the total heat values supplied in solid and gaseous form, and be prepared to supply in any form desired. When it is stated that nearly 20,000 bags of coke were sold by the Australian Gas Light Company on one day during the winter period, with little attention to preparation and no publicity, and more could have been sold had we the facilities for faster loading, you will agree that the prospects for the future in regard to coke sales are excellent. Consideration is also being given to the supply of ¼ cwt. lots of coke for slow combustion stoves or open grates, in paper bags, for the poorer people of the city.

It is suggested that a selection of the most attractive slow combustion stoves be placed on view in all showrooms, and that extended terms of payment be allowed.

The formation of a National Coke Association to deal with the preparation, utilization, and sales of coke in the various States, is recommended.

Recently, owing to severe competition from electricity, so much attention has been given to Service to consumers, customer contact, sales and service, staff training, advertising, &c., that the engineer is becoming, for want of a more appropriate term, the "forgotten man." It is not until profits show a decline, or that he requires money for extensions to works, that any real notice is taken of him. In the past the engineer has been so engrossed in his work as to care little for publicity, but he now finds that he will have to assert himself in order to be recognized. The fact that upon his skill and attention to details in construction and manufacture a cheap and reliable product is available is often overlooked. After all, what is the use of all the various departments without a product that is competitive with other forms of heat?

The American Gas Industry in 1937

Bulletin Issued by the A.G.A.

The year 1937 was one of continued progress and expansion for the gas companies in the United States, according to Mr. Alexander Forward, Managing Director of the American Gas Association.

Manufactured and natural gas companies, supplying towns and cities with a population of 80,000,000, served a total of 17,022,000 customers, representing the largest number of consumers ever connected to the mains of the Industry and an increase of 517,000 over the year 1936. Of these, 9,976,000 were served by the manufactured gas industry and the remaining 7,046,000 were served by the natural gas industry. Revenues of the entire Industry, both manufactured and natural, aggregated $801,931,000, a gain of 4·1% over the preceding year of 1936. The natural gas companies grossed $441,176,000, a gain of 6·9% for the year, while revenues of the manufactured gas companies were $360,755,000, as compared with $357,531,000 in 1936.

Sales of manufactured gas for domestic uses, other than house heating, such as cooking, refrigeration, water heating, amounted to 195,077,000,000 cu.ft., a decline of 1·6% for the year. House heating sales, however, registered a gain of 9%. On the other hand, the sales of natural gas for domestic uses registered a pronounced upturn, rising from 343,473,000,000 cu.ft. in 1936 to 362,021,000,000 cu.ft. in 1937, a gain of 5·4%. Sales of both manufactured and natural gas for industrial and commercial purposes in 1937 averaged about 10% above the previous year.

Preliminary estimates indicate that the total production of natural gas in 1937, including amounts used in the manufacture of carbon black and for field purposes, reached a record figure of more than two and one-half million million cu.ft., or more than 17% above the previous peak established in 1936. Approximately 170,000 million cu.ft. of natural gas were used as fuel for generating electric power in 1937. This was an increase of nearly 9% over the previous year.

During 1936 alone, 1,464,000 gas ranges were sold, more than equal to the entire number of electric ranges in use at that time. Preliminary estimates for the year 1937 indicate sales of nearly 1,600,000 ranges, a gain of 10%, a figure equalling the previous peak established in 1929. More cooking is done on a satisfactory new range than on an out-of-date and inconvenient old range. Modern ranges, however, require considerably less gas for the same cooking operations and there is some question whether any increase in the consumption of gas for cooking will result. However, the availability of these more efficient ranges strengthens materially the competitive position of the Industry.

Many gas companies have recently inaugurated more favourable rates for house heating through central plant burners and equipment. It is estimated that the total number of gas central house heating installations connected to the lines of all United States gas companies in 1937 amounted to 735,000. In addition there were approximately 1,300,000 dwellings heated by unit heaters, space heaters, floor furnaces, &c., giving a total of more than 2,000,000 homes in the United States that are heated by gas.

The past year and a half has been characterized by an increasing appreciation of the great potential market for domestic water heating. There has been a widespread adoption of rates more favourable to the use of gas for this purpose. This has been accompanied by a marked acceleration of local sales effort and a nation-wide co-ordinated campaign to promote the use of gas for water heating. So successful have been the results of this programme that it will be continued during 1938. For instance, the sale of automatic type gas water heaters during 1937 is expected to average more than 20% above 1936.

In recent years, the Gas Industry has supplemented the substantial amount of research conducted by gas appliance manufacturers by a vigorous and well-planned programme of research and development through the American Gas Association. Even better and more efficient gas equipment will shortly be available; which should serve to enhance the competitive position of gas. Gas is also receiving increased recognition in the air-conditioning field, where control of humidity as well as temperature is required.

The use of gas for commercial and industrial purposes throughout the country is growing rapidly in volume. New outlets are presenting themselves in this branch of the Industry. Recent marked changes in materials which go into dwelling structures calling for more use of structural steel, glass, brick, synthetic stone, metallized wood, fabricated steel and concrete in home construction are resulting in a correspondingly greater demand for use of gas in the production of these products.

In the field of industrial utilization new processes have been developed and equipment with improved efficiencies have come into general use. For example, a few years ago there was a distinct trend in the larger newspaper offices of the country toward metal melting by electricity for stereotyping and other purposes. Through the American Gas Association's co-operative research with manufacturers, methods have been developed resulting in general acceptance of gas heat for these purposes by the newspaper industry.

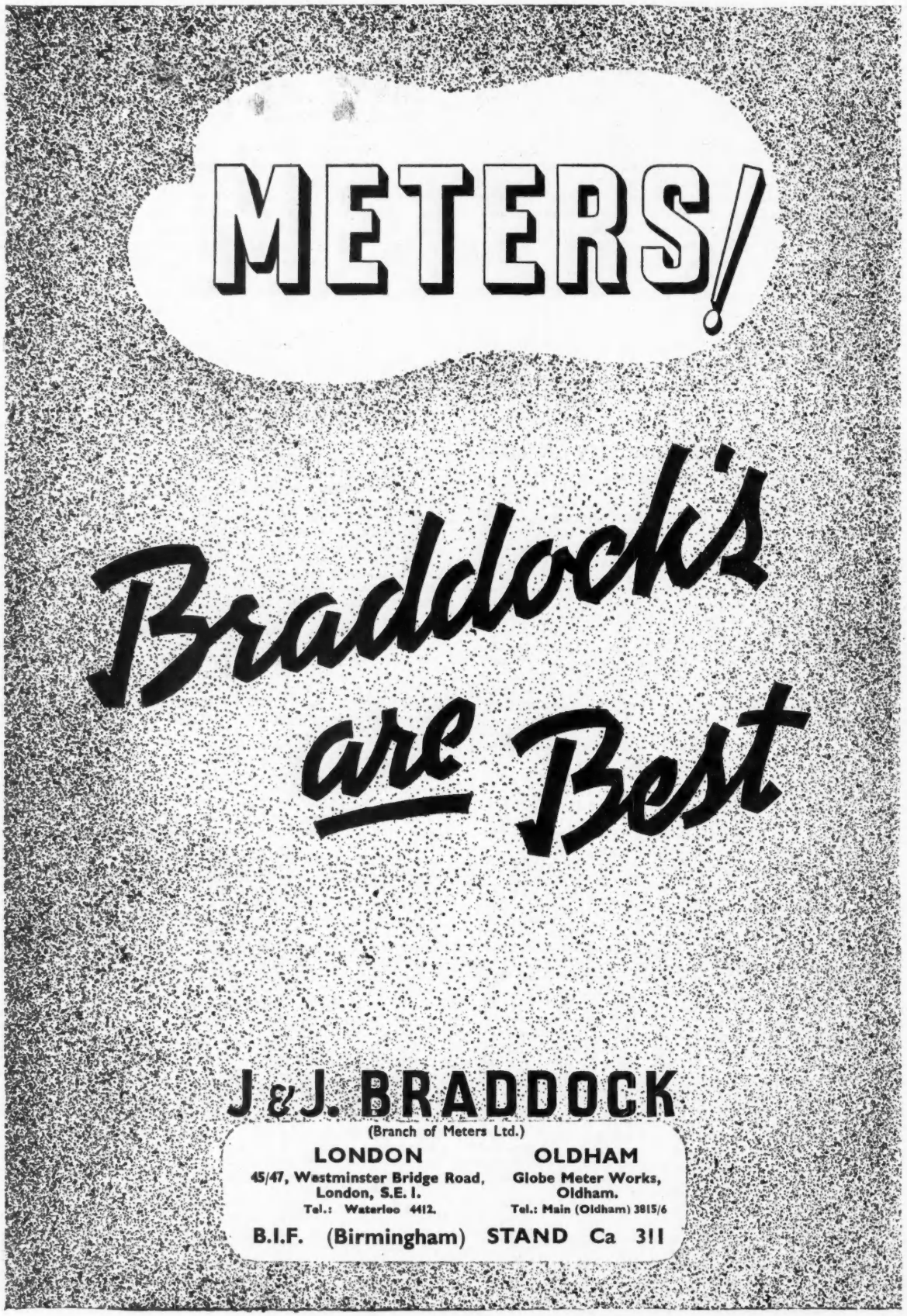
Starting with the July, 1937, issues of ten national magazines and twenty-three trade magazines, the Gas Industry entered the second of its three-year $1,500,000 national advertising programme. Advertising messages appearing in two colours during the year numbered in excess of 100,000,000. The purpose of this co-operative movement, supported by more than 700 operating companies, is the promotion of gas as a modern fuel for domestic, commercial, and industrial purposes. A notable development during the year was the increased volume of advertising placed by the manufacturers of gas appliances, all of it tying in and adding weight to the national programme.

The radio programme featuring two talks a week by the Mystery Chef continued over thirteen Eastern and five Pacific Coast Stations of the National Broadcasting Company. Nearly 2,000,000 copies of a cookery book entitled, "Be An Artist at the Gas Range" have been called for in person at the offices of participating gas companies by the Mystery Chef's radio fans.

During 1938 the building and construction industries promise to be more active than in many recent years. Plans that the Industry get its rightful share of business in the new home field have crystallized into the formation of a Home Appliance Planning Bureau.

The American Gas Association in conjunction with the utility and appliance manufacturing companies will launch a complete programme including an architectural competition for design of all gas homes, and a builders' contest for the construction of the same. $23,700 has been appropriated as prizes for these competitions. Reproduction of some of the prize-winning homes at the World's Fair is also contemplated in the programme.

The programme will be announced in the March issue of the Architectural Forum, which will include a special all-gas section composed of the specifications of the equipment and appliance manufacturers.


METERS!
Braddock's are Best
J & J. BRADDOCK
(Branch of Meters Ltd.)
LONDON
45/47, Westminster Bridge Road, London, S.E. 1.
Tel.: Waterloo 4412.
OLDHAM
Globe Meter Works, Oldham.
Tel.: Main (Oldham) 3815/6
B.I.F. (Birmingham) STAND Ca 311

A Visit to the New Headquarters of the London Fire Brigade

Many humorous sketches have been produced, on both stage and radio, the theme of which depicts an unfortunate citizen seeking the services of the local fire brigade. For all the world like dealing with a Government department, he has to make his application in writing, stating on the appropriate form (No. XYZ 1234, which may be obtained from any post office) the address and nature of the fire, together with the age, occupation, and antecedents of its owner. Only after this application has been carefully considered by the Fire Chief will the brigade—provided, of course, it has at the time no other engagements (social or otherwise)—consent to deal with the matter in strict rotation.

On New Year's Day members of the London and Southern District Junior Gas Association learnt just what does happen in real life when one dials "999" on the telephone and calls the London Fire Brigade. A large party paid a visit to the new Headquarters on the Albert Embankment, S.E., of the London County Council Fire Brigade—and an extraordinarily interesting and instructive afternoon was spent gaining an insight into the wonderful machinery which is set instantly in motion by the sounding of a fire alarm.

First we had a demonstration turn-out of three appliances. One moment all is peace and quiet. Then the alarm bell sounds. Firemen appear miraculously out of the ceiling, sliding down shiny steel poles. Colour-light signals automatically hold up all the traffic on the Embankment outside. One pull on a wire opens the main doors—and within thirty seconds of the alarm bell first sounding, the appliances are on their way to the fire. Indeed, the average time taken to get to the scene of an outbreak is as little as 2½ minutes.

We subsequently inspected the various appliances and followed this up with a thorough tour of the fine building and the workshops. Among the vehicles inspected was one of the very latest turntable ladders, which will extend to a height of 101 ft. and has a speed of 55 m.p.h. There are also the modern types of covered escape vans, fully equipped with breathing apparatus, foam generators, jumping sheets (which in view of the height of the escape ladders are now rarely needed), first-aid appliances, &c., hose lorries, emergency tenders, dual purpose appliances, pumps, and an up-to-date canteen vehicle which goes out to the scene of fires to provide refreshments for the men. An illuminated indicator shows at a glance what appliances are required for any outbreak. At these Headquarters is the main Control Room for the whole London Brigade, where a check is kept of all the appliances that go out to individual fires. Thus, if another call comes in while a number of engines are already out at a fire, the Control Room Superintendent knows immediately to which stations to apply for additional appliances. There are 1,984 officers and men of the uniformed staff throughout the London Brigade, together with 163 administrative, technical, clerical, and workshop staff. There are 59 land stations and three river stations. The following figures are also of interest. The number of calls received during 1936 was 4,746 fires, 928 chimney fires, 201 special service calls, 2,118 false alarms due to electrical faults and other causes, and 1,304 malicious false alarms. The last-named were in many cases given by children, and it was emphasized to the visitors that to cause fire appliances to be away from their stations when no fire exists is a very serious matter. For, while the appliances are out, genuine calls may be received, and because appliances cannot be sent out immediately lives may be lost. In any case, the fires will be given more time to do damage before the firemen can arrive.

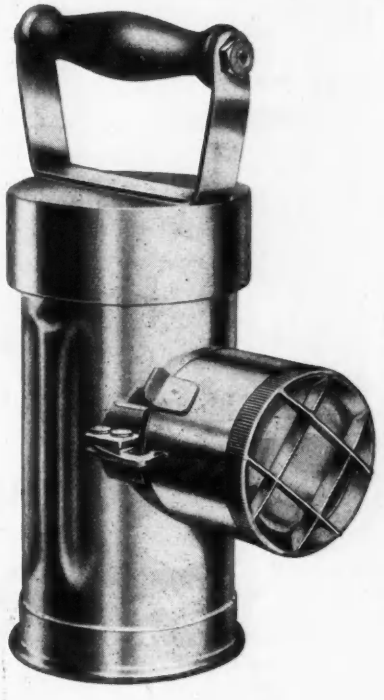
In the basement of the building are the central heating boilers, washing and drying rooms for the firemen when they return from fires with their clothes wet through, and also demonstration and practice rooms for training purposes. In the former are examples of various types of automatic extinguishers and fittings, while a sealed chamber is filled with smoke for practising with breathing apparatus. The new Headquarters also include a most interesting museum where, in addition to actual and model appliances which trace the development of the brigade from its early days, are a number of engravings of famous fires and some rather gruesome relics which are doubtless intended to have a salutary influence upon young trainees.

Behind the main building is a large yard which is used for practices, in the corner of which is a brick representation of a building in the form of a tower 118 ft. high. This is used for practising rescue work, and a realistic effect is obtained by the use of smoke and fireworks.

So far gas has not been mentioned in connection with these new Headquarters of the London Fire Brigade. But it has not been forgotten; in fact, it plays a useful part in the equipment of the building. On the upper floors are recreation rooms, mess-rooms, and a number of residential flats for officers. The following gas appliances are installed for various purposes: Three 10-gall. coppers, one 3-oven cooker, one 2-oven cooker, sixteen single-oven cookers, two Jackson boilers, and two hotclosets.

NIFE

SAFETY LAMP
type NG7.



THE ONLY LAMP

carrying full official approval for use in Towns Gas, Hydrogen, Petroleum and other Highly Inflammable atmospheres.

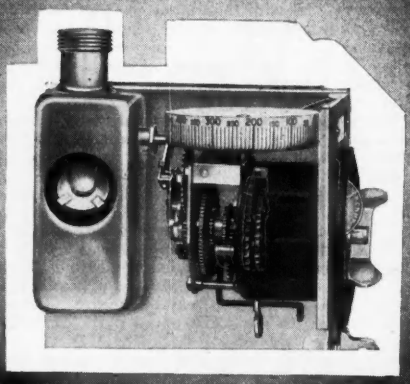
Fitted with NIFE Steel Plate Accumulator as standardised in Admiralty handlamps and thousands of Miners' Lamps throughout the World.

Write for publication No. 1337.

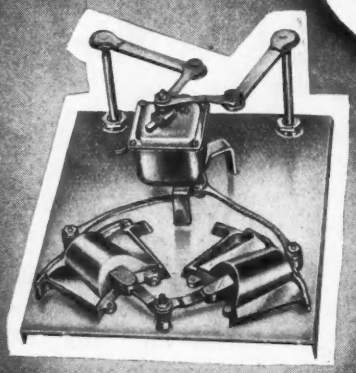
TRIALS GLADLY ARRANGED.

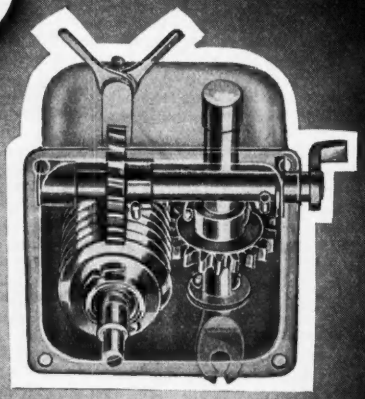
BATTERIES LIMITED
HUNT END WORKS REDDITCH

SMITH METERS LTD



THE COMBINATION WHICH HAS WITHSTOOD THE TEST OF TIME





Head Office and Works :

186, KENNINGTON PARK RD., LONDON, S.E.11

Telephones : RELIANCE 2447-8-9. POLLARDS 2371-2-3, 4000.
Telegrams : SMIETERS, LAMB, LONDON.

3-4, EAST PARADE, LEEDS, 1
Telephone : LEEDS, 23726

Australian Agents : GAS METERS PTY. LTD., SYDNEY

Markets and Manufactures

Current Sales of Gas Products

The London Market

Jan. 10.

There is little of interest to record in the prices of Tar Products in the London market, which remain steady at about the following levels:

Pitch, 38s. per ton f.o.b.
Creosote, 5⅞d. to 6d.
Refined tar, 3¾d.
Pure toluole, about 2s. 4d.
Pure benzole, 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, about 12s.
Prices are per gallon naked at makers' works.

The Provinces

Jan. 10.

The average prices of gas-works products during the week were: Gas-works tar, 24s. 3d. to 29s. 3d. Pitch—East Coast, 38s. to 39s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 38s. to 39s.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅜d. to 4½d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid 60's, 3s. 6d. to 3s. 9d. Naphthalene, £14 to £17. Salts, 80s. to 85., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Jan.* 8.

The year has opened quietly, but distillers are meantime maintaining their quotations.

Crude gas-works tar.—Actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch is valued at 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar.—Prices have not yet been fixed for the coming season, although an increase is anticipated. To-day's values remain unchanged at 3d. to 3¼d. per gallon free on rails for export, and 3½d. to 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—There is a fairly steady business being conducted in all grades as under: Specification oil, 5d. to 5¼d. per gallon; low gravity, 6d. to 6¼d. per gallon; neutral oil, 5d. to 5¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—New business is still difficult, and the following prices can only be taken as approximate: Pale, 97/99%, 3s. to 3s. 3d. per gallon; dark, 97/99%, 2s. 9d. to 3s. per gallon; and pale, 99/100%, 3s. 6d. to 4s. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies command 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is steady at 1s. 5d. to 1s. 6d. per gallon, and 90/190 heavy naphtha, 1s. to 1s. 1d. per gallon.

Motor benzole is valued at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine.—Prices are nominal at 11s. to 12s. per gallon for 90/160 grade, and 12s. to 13s. per gallon for 90/140 grade.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.				
Crude benzole..	0	9¼	to	0	10	per gall. at works			
Motor ,, ..	1	3	,,	1	3½	,,	,,	,,	
90% ,, ..	1	4	,,	1	4½	,,	,,	,,	
Pure ,, ..	1	8	,,	1	8½	,,	,,	,,	

Contracts Advertised To-Day

Coal.
Coalville Gas Department. [p. 141.]
Market Harborough Gas Department. [p. 142.]

Mainlaying.
Lincoln Gas Department. [p. 142.]

Mantles.
Salford Gas Department. [p. 141.]

Meters.
Salford Gas Department. [p. 141.]

Pipes and Fittings.
Salford Gas Department. [p. 141.]

Refractory Materials.
Salford Gas Department. [p. 141.]

Stores.
Salford Gas Department. [p. 141.]

Applications for Patents

BULLOCK, D. C.—Metal radiants for gas fires. No. 36287.

PARKINSON & COWAN (GAS METERS), LTD.—Street Lamps. Nos. 35149 and 35150.

SUGG, P. C., and W. SUGG & CO., LTD.—Gas lamp construction. No. 35813.

WOODALL-DUCKHAM (1920), LTD.—Coke ovens. Nos. 34815-18—Apparatus for charging carbonizing retorts. No. 35204.

Complete Specifications Accepted.

GAS LIGHT AND COKE COMPANY, GRIFFITH, R. H., and CRAWLEY, B.—Purification of combustible gases containing free hydrogen. No. 476684.

UNITED GAS INDUSTRIES, SMITH, E. W., and CHARLES, A. — Prepayment mechanisms for gas meters. No. 476995.

RADIATION LTD., YATES, H. J., and MULROY, V. H.—Combined gas and solid-fuel fires. No. 476825.

Diaries, Calendars, &c., Received

Seasonable gifts in the form of diaries, calendars, &c., have been received from the undermentioned friends, whose good wishes are cordially reciprocated:

R. and J. Dempster, Ltd., Manchester.
Oxley Engineering Company, Ltd., Hunslet, Leeds.
Peckett & Sons, Ltd., Bristol.
Stanton Ironworks Company, Ltd., nr. Nottingham.

PROTECT WITH

METROTECT

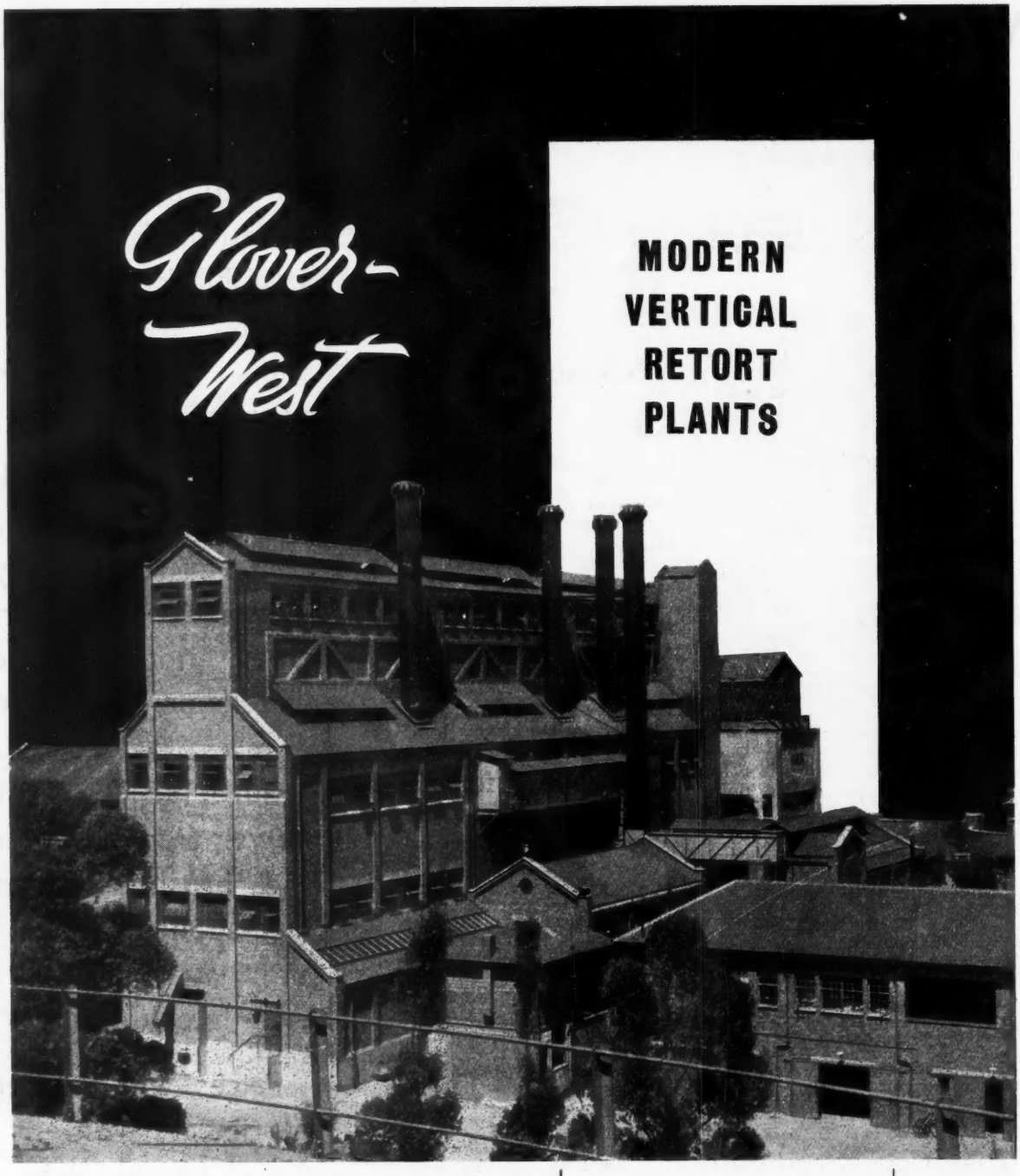
a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.



JOHANNESBURG S. A.

Since the complete new Cottesloe Gas Works was built for the Johannesburg Council by the West organisation in 1928, the original 18-retort battery of Glover-West verticals has been trebled. The third unit recently put into service is foremost in the picture. It brings the total retorts to 54 and the total production capacity of this typically modern works to 4½ million cubic feet.

● Carbonizing plants of West design and construction represent to-day's methods of gas manufacture all over the world. The 414 plants built or in progress are distributed over 24 countries.

WEST'S GAS IMPROVEMENT CO. LTD. • MILES PLATTING • MANCHESTER 10

GAS STOCKS AND SHARES

There was more confidence and more business in most sections of the Stock Exchange last week. Speculators began operations again, especially in the mining market, and at times a steady flow of orders came in from general investors. Several factors were responsible for the changed conditions, and chief among these were the favourable dividend announcements by the leading banks and better news from Wall Street. Gilt-edged stocks maintained their popularity and closed fractionally higher. Home rails, however, reacted and were one of the few weak spots. There was selective buying in the industrial market and many of the favourites made good progress.

The Gas market shared in the general increase in the volume of business, though very little of this was reflected in prices, which with few exceptions remained unchanged. In the Official List South Metropolitan ordinary closed fractionally higher, but Tottenham ordinary lost 1 point and United Kingdom Corporation £1 shares dropped 6d. A sharp fall of 7 points to 72½ occurred in Cape Town 4% debenture, business being recorded at 70. On the provincial Exchanges Chester ordinary hardened 1½ points to 108, and with the exception of a drop of 2 in Slough ordinary the nominal quotations in the Supplementary List closed unchanged.

In the lists of stocks offered this week there are several good parcels of reliable preference issues worth consideration for investment purposes in any well-spread list of holdings. Among these are the following:

Amount.	——	Price.	Gross Yield.
£			£ s. d.
10,000	Associated Gas and Water 4% Cum. Red... (Dividend accrues from 1/1/1938)	20/- free	4 0 0
1,685	Gas Consolidation 4% Red.	20/3	3 19 0
12,500	Gas Light 3¾% Red.	103½	3 13 0
400	Romford 5½%	127½	4 6 3
27,000	Sheppy 4% Cum. .. .. (4 months' dividend payable next March)	96	4 3 9
1,500	South Metropolitan 6%	135	4 9 0
1,900	South Suburban 3¾% Red.	101	3 14 3
50,000	United Kingdom Corpn. 4½% 1st Cum. ..	20/6 free	4 7 6
50,000	United Kingdom Corpn. 4% 1st Red. Cum.	20/- free	4 0 0

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 7.	Rise or Fall on Week.
1,767,439	Sept. 6	8	8	Alliance & Dublin Ord. ...	158—163	...
374,000	Dec. 13	4	4	Do. 4 p.c. Deb. ...	95—100	...
558,890	Aug. 9	7	7	Barnet Ord. 7 p.c. ...	158—163	...
300,000	Oct. 4	1/9¹	1/4½	Bombay, Ltd.	26/—28/–	...
179,915	Aug. 9	9½	9½	Bournemouth sliding scale ...	200—205	...
590,407	,,	7	7	Do. 7 p.c. max. ...	158—163	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...
50,000	Dec. 13	3	3	Do. 3 p.c. Deb. ...	78—83	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	98—103	+1
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Aug. 9	7½	7½	Brighton, &c., 6 p.c. Con. ...	150—155	...
649,955	,,	6½	6½	Do. 5 p.c. Con. ...	133—138	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	127—133	...
855,000	Sept. 20	8	7	British Ord.	139—144	...
100,000	Dec. 13	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1½—2½	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	Dec. 13	4½	4½	Do. 4½ p.c. Deb. ...	70—75	−7
626,860	July 19	6	6	Cardiff Con. Ord.	125—130	...
237,860	Dec. 13	5	5	Do. 5 p.c. Red. Deb.	106—111	...
98,936	Oct. 4	2/-	2/-	Colombo Ord....	1⅞—1⅞	...
24,510	,,	1/4¹	1/4½	Do. 7 p.c. Pref.	23/6—25/6	...
739,453	Oct. 4	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/–	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/–	...
1,775,005	Aug. 9	5	5	Commercial Ord.	80—85	...
620,000	Nov. 29	3	3	Do. 3 p.c. Deb. ...	73—78	...
286,344	Aug. 23	5	5	Do. 5 p.c. Deb. ...	113—118	...
807,560	Aug. 9	7	7	Croydon sliding scale... ...	140—145	...
644,590	,,	5	5	Do max. div.	110—113	...
620,385	Dec. 13	5	5	Do. 5 p.c. Deb.	112—117	...
239,000	Aug. 9	5	5	East Hull Ord. 5 p.c....	98—103	...
185,355	Aug. 9	6	6	East Surrey Ord. 5 p.c. ...	120—125	...
176,211	Dec. 13	5	5	Do. 5 p.c. Deb. ...	112—117	...
250,000	Nov. 15	7	4	Gas Consolidation Ord. ...	19/6—21/6	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	18/6—20/6	...
19,255,284	Aug. 9	5½	5½	Gas Light & Coke 4 p.c. Ord.	24/6—25/6a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	83—86	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref.	100—103	...
2,993,000	July 5	...	3¾	Do. 3¾ p.c. Red. Pref.	101½—103½	...
8,602,497	Nov. 29	3	3	Do. 3 p.c. Con. Deb.	78—81	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb.	112—115	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb.	110—113	...
700,000	Sept. 6	3½	3½	Do. 3½ p.c. Red. Deb.	98—101	...
270,466	Aug. 23	6	6	Harrogate New Cons. ...	115—120	...
157,500	April 5	1/2½	1/2½	Hong Kong and China Ord	1—1½	...
213,200	Aug. 9	6	6	Hornsey Con. 3½ p.c. ...	118—123	...
5,600,000	Nov. 1	12	8	Imperial Continental Cap. ...	135—140	...
223,130	July 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...
285,242	Aug. 9	8½	8½	Lea Bridge 5 p.c. Ord. ...	170—175	...
11,751	Aug. 23	10	8	Maidstone 5 p.c. Cap.... ...	180—190	...
63,480	Dec. 13	3	3	Do. 3 p.c. Deb. ...	70—75	...
75,000	Nov. 29	†10	†10	Malta & Mediterranean ... Metropolitan (of Melbourne)	145—155	...
392,000	Oct. 1	5½	5½	5½ p.c. Red. Deb.	100—103	...
231,978	Aug. 23	5	5	M.S. Utility 'C' Cons. ...	101—106	...
968,657	,,	4	4	Do. 4 p.c. Cons. Pref.	96—101	...
360,075	Dec. 13	4	4	M.S. Utility 4 p.c. Deb. ...	97—102	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	112—117	...
675,000	Nov. 15	†9	†6	Montevideo, Ltd.	85—90	...
250,000	Aug. 9	7½	7½	North Middlesex 6 p.c. Con.	147—152	...
396,160	Aug. 9	5	5	Northampton 5 p.c. max. ...	110—115	...
300,000	Oct. 18	†7	†9	Oriental, Ltd.	153—158	...
468,537	Dec. 13	8	8	Plymouth & Stonehouse 5 p.c.	154—159	...
621,667	Aug. 9	8½	8½	Portsmouth & Gosport Cons.	164—169	...
241,446	,,	5	5	Do. 5 p.c. max. ...	104—109	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...
247,966	Dec. 13	4	4	Primitiva 4 p.c. Cons. Deb. ...	95—100	...
625,959	July 5	4	4	Do. 4 p.c. Red. Deb. ...	94—97	...
15,000	Sept. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	9—9½	...
441,275	Sept. 20	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/6—23/6	...
460,810	,,	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Aug. 23	5	8½	Shrewsbury 5 p.c. Ord. ...	130—135	...
9,000	June 7	4	4	South African Ord.	3¾—4¼	...
1,371,752	Sept. 6	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	23/—25/–	...
871,636	,,	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/–	...
450,000	Aug. 9	4	4	Do. 4 p.c. Deb.	99—102	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
6,709,895	Aug. 9	6	5	South Met. Ord.	102—104	+½
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pf. ...	131—136	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pf. ...	98—101	...
1,895,445	Dec. 13	3	3	Do. 3 p.c. Deb. ...	74—79	...
1,000,000	July 5	5	5	Do. 5 p.c. Red. Deb....	110—113	...
1,543,795	Aug. 9	6	6	South Suburban Ord. 5 p.c. ...	120—125	...
512,825	,,	5	5	Do. 5 p.c. Pref....	110—115	...
500,000	,,	4	4	Do. 4 p.c. Pref....	95—100	...
250,000	,,	...	§18/9	Do. 3¾ p.c. Red. Pref.	98—101	...
888,587	Dec. 13	5	5	Do. 5 p.c. Deb....	113—118	...
250,000	,,	4	4	Do. 4 p.c. Deb....	97—100	...
200,000	Sept. 20	...	3½	Do. 3½ p.c. Red. Deb.	94—99	...
427,859	Nov. 1	1/2½	9½	S. Western Gas & Water Ord.	18/6—20/6	...
160,523	,,	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pf.	19/6—21/6	...
110,000	Dec. 13	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...
750,541	Aug. 9	5½	5	Southampton Ord. 5 p.c. ...	111—116	...
148,836	Dec. 13	4	4	Do. 4 p.c. Deb.	96—101	...
350,000	Aug. 23	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...
94,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100*	...
1,076,490	Aug. 9	6¾	6¾	Tottenham and District Ord.	131—136	−1
409,835	,,	5½	5½	Do. 5½ p.c. Pref....	121—126	...
62,235	,,	5	5	Do. 5 p.c. Pref....	109—114	...
371,850	Dec. 13	4	4	Do. 4 p.c. Deb....	97—102	...
85,701	July 19	‡6	6	Tuscan 6 p.c. Red. Deb. ...	96—101	...
888,629	Oct. 4	6	4	U. Kingdom Gas Cor. Ord....	19/—21/–	−/6
937,743	Nov. 15	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/–	...
500,000	,,	...	-/1·15	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/–	...
745,263	Dec. 13	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/6—18/6	...
1,000,000	Sept. 20	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
373,939	Aug. 9	7	7	Uxbridge, &c., 5 p.c.	138—143	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...
1,371,138	Aug. 9	7	7	Wandsworth Consolidated ...	140—145	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	99—102	...
1,343,964	Dec. 13	5	5	Do. 5 p.c. Deb. ...	113—118	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
558,342	Aug. 9	7	7	Watford and St. Albans Ord.	140—145	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	121—126	...
200,000	Nov. 29	4	4	Do. 4 p.c. Red. Deb.	95—100	...
100,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	94—99	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 7.	Rise or Fall on Week.
202,152	Sept. 6	25/-b	5	Ascot Ord.	100—105	...
128,182	Dec. 13	5	5	Do. 5 p.c. Pref.	108—113	...
573,156	Nov. 15	5	5	Assd. Gas and Water Ord. ...	19/—21/-	...
167,506	,,	...	-/4c	Do. 4 p.c. Red. Cum. Pref.	19/—20/-	...
253,118	,,	...	4	Do. 4 p.c. Irred. Pref. ...	18/—20/-	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-	...
500,000	Sept. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
31,035	Aug. 23	...	-/4½	Associated Utilities 4 p.c. Pref.	16/6—18/6	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb....	95—100	...
17,000	Aug. 23	8	8	Bognor Orig. Ord. 'A' ...	160—170	...
62,210	,,	8	8	Do. New Addl. 'A' ...	160—170	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	141—146	...
37,440	Aug. 9	10	10	Cam. Univ. & Town10 p.c. max.	193—203	...
125,970	,,	7	7	Do. 7 p.c. max.	135—140	...
39,025	,,	5	5	Do. 5 p.c. max.	98—103	...
65,000	Aug. 9	8½	7½	Eastbourne 'A' 5 p.c. ...	158—163	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	128—133	...
112,312	,,	5	5	Do. 5 p.c. Pref.	108—113	...
130,000	Dec. 13	5	5	Do. 5 p.c. Deb.	113—118	...
24,000	Aug. 23	8½	8½	Great Yarmouth 8½ p.c. max.	44—49	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	34—39	...
51,160	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
152,600	Sept. 6	9	8	Guildford Cons.	170—175	...
54,055	,,	5	5	Do. 5 p.c. Pref.	110—115	...
68,250	Dec. 13	5	5	Do. 5 p.c. Deb.	112—117	...
156,600	Aug. 23	7½	7½	Hampton Court Cons. ...	158—163	...
73,620	Sept. 6	8½	8½	Luton Cons. 'A'	163—168	...
107,960	Sept. 20	5½	4	Mid Kent Ord.	8½—9½	...
230,940	Aug. 9	10	10	Oxford & District Ord. ...	205—210	...
47,112	,,	5	5	Do. 5 p.c. Pref.	108—113	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	110—115	...
126,193	Nov. 15	7½	7½	Peterborough Ord.	158—163	...
64,990	Sept. 6	7½	6½	Redditch Ord....	125—135	...
166,850	Aug. 9	8	8	Romford Ord....	155—160	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Sept. 20	5	5	Do. 5 p.c. Deb.	113—118	...
25,570	Aug. 9	5½	5½	Rugby 5½ p.c. Pref.	125—130	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111	...
42,750	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
10,950	Aug. 23	8	8	Ryde Ord.	158—163	...
270,086	Sept. 6	7	7	Slough Ord.	133—138	- 2
21,000	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	Nov. 1	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...
28,866	Sept. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
137,730	Aug. 9	7	7	Southgate & Dist. 7 p.c. max.	140—145	...
62,500	,,	5	5	Do. 5 p.c. Pref.	110—115	...
117,228	Aug. 23	5	5	Swindon Cons.	106—111	...
60,425	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
64,380	Dec. 13	5	5	Torquay and Paignton 5 p.c. Pf.	108—113	...
33,858	Nov. 15	...	-/2·70c	United Kingdom Gas Corpn. 4½ p.c. 1st Cum. Pref. ...	20/—22/-	...
130,000	Aug. 9	8	5	Wakefield Ord.	120—125	...
81,650	,,	5	5	Do. 5 p.c. max.	103—108	...
82,000	Aug. 9	6	6	Weymouth Ord.	103—108	...
98,384	Aug. 9	6	6	Wolverhampton 6 p.c. Pref....	120—125	...
160,000	Dec. 13	5½	5½	Do. 5½ p.c. Rd. Db.	107—112	...
90,000	Dec. 13	5	5	York 5 p.c. Red. Deb.... ...	104—109	...
133,640	July 19	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	128—133	...
120,000	,,	5	5	Do. 5 p.c. Pref.	108—113	...
35,000	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	121—126	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Jan. 7.	Rise or Fall on Week.
347,756	July 19	6	5	Bath Cons.	120—122	...
1,667,250	July 19	5	5	Bristol, 5 p.c. max.	116—118	...
120,420	Dec. 13	4	4	Do. 1st 4 p.c. Deb. ...	100—102	+1
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100—102	+1
328,790	,,	5	5	Do. 5 p.c. Deb.	118—121	...
274,000	July 19	5	5	Newport (Mon.) 5 p.c. max....	100—102	-1½
13,200	Sept. 6	8	7	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...
13,600	,,	6	5	Do. 7 p.c. 'B'	11⅞—12⅝	...
40,000	,,	6	5	Do. 7 p.c. 'C'	11⅞—12⅝	...
140,778	Aug. 9	5	5	Weston-super-Mare Cons. ...	110—112	...
64,338	Jan. 3	4	4	Do. 4 p.c. Deb.	94¼—96½*	-1½
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	154—157	-3

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Jan. 7.	Rise or Fall on Week.
157,150	Aug. 9	6½	5	Chester 5 p.c. Ord.	106—110	+1½
92,500	Dec. 13	4	4	Do. 4 p.c. Pref.	96—100	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	88—91	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 23	6	6	Liverpool 5 p.c. Ord.... ...	125½—127½	...
245,500	Dec. 13	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...
306,083	July 1	4	4	Do. 4 p.c. Deb. ...	102—104	...
106,280	Aug. 9	10	10	Preston 'A' 10 p.c.	206—216	...
188,219	,,	7	7	Do. 'B' 7 p.c.	147—157	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Jan. 7.	Rise or Fall on Week.
122,577	Aug. 9	8	8	Blyth 5 p.c. Ord.	165—166	...
732,000	Aug. 9	5	5	Hartlepool G. & W. Cn. & New	112—114	...
2,061,315	Aug. 9	5⅝	5	Newcastle & Gateshead Con.	23/3—23/9a	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	98—100	...
776,706	Jan. 3	3½	3½	Do. 3½ p.c. Deb. ...	89½—90½*	-1
277,285	Nov. 1	5	5	Do. 5 p.c. Deb. '43...	103—105	...
332,351	Aug. 23	6	6	Sunderland 6 p.c. max. ...	139—141	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Jan. 7.	Rise or Fall on Week.
542,270	Aug. 9	9	6	Derby Con.	135—145	...
55,000	Dec. 13	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 13	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Jan. 7.	Rise or Fall on Week.
10,000	Sept. 20	10	10	Great Grimsby 'A' Ord. ...	210—220	...
6,500	,,	10	10	Do. 'B' Ord. ...	210—220	...
79,000	,,	10	10	Do. 'C' Ord. ...	205—210	...
1,806,339	Aug. 23	6	6½	Sheffield Cons.	144—148	...
95,000	Jan. 3	4	4	Do. 4 p.c. Deb.	100—103*	...

a The quotation is per £1 of Stock. *b* Actual for Quarter. *c* Actual. * Ex div.

PUBLISHERS' NOTICE

TERMS OF SUBSCRIPTION

United Kingdom & Ireland : Advance Rate, 35/- per annum; 18/- per half year. Credit Rate : 40/- per annum; 21/- per half year
Dominions & Colonies & United States: 35/- per annum, in advance. Other countries in the Postal Union, 40/- per annum, in advance.

A copy of the "G.J." Calendar and Directory is presented to continuous subscribers.

CLASSIFIED ADVERTISEMENTS

Situations Wanted, 6d. a line (minimum 3/-, about 36 words). Situations Vacant, Plant for Sale and Wanted, Contracts, Public Notices, Educational, &c., 9d. a line (minimum 4/6). Financial Notices, 1/- per line. Box Number, 6d. extra.

WALTER KING, LTD.,

Telephone : Central 2236-7-8. 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4. Telegrams : Gasking, Fleet, London.